Environmental Authority PL1158 (PL202) Amendment Application - Supporting Information Report February 2026

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1. Introduction

OGT submitted a minor amendment application to DETSI for EA P-EA-100227919 on 25 November 2025 to include:

- Fracture stimulation conditions, and
- A low hazard dam to support fracture stimulation operations.

On the 12th of January 2026 DETSI issued an information request for a non-minor amendment (otherwise known as a major amendment). The information request is provided in Appendix A.

This supporting information document has been revised to incorporate the responses to the DETSI information request. To facilitate easy reference, a cross-reference table has been prepared; see Table 1 for details.

Table 1 Cross reference table for the request for information

Information requested	Detailed request	Section of the document where this is addressed
1) Wells authorised under the environmental authority (EA) (P-EA-100227919)	According to section 4.2 of the supporting information, there are currently 4 producing wells within PL202 (PL1158) as listed below: Waggamba-1 Waggamba-3 Waggamba-4H Waggamba-5H However, Waggamba-1 is not listed in Table 5 and Waggamba-3 has been listed as "shut-in" rather than "producing". Information requested: 1.1 Review and update Table 5 to ensure the status of all wells is accurately reflected.	See Table 6 in Section 5.2
2) Previous stimulation	According to the supporting information, wells in the area have historically undergone stimulation treatments, particularly the conventional wells. This was primarily due to the tight nature of the target formation, which typically exhibits low permeability and limited natural flow capacity. The wells Churchie-1 and Namarah-1 were specifically mentioned as they were known to have been stimulated, both targeted the same reservoirs at similar depths and geologic conditions, and the stimulation was completed successfully. Information requested: 2.1 Provide further details as below: a) Chemical composition of the fraccing fluid utilised. b) Quantity (litres) of fraccing fluid utilised. c) Percentage of fraccing fluid recovered. d) Pre and post fraccing groundwater quality. 2.2 Provide a comparison of the bore log data, to identify how the target depths and geological formations of the proposed wells align with those of the existing wells (e.g. Churchie-1 and Namarah-2).	See Section 7.2.2 *Note: Namarah-1 is not discussed in this document as it is not in the same target formation and is not within the OGT tenure.*
3) Wetlands	The supporting information references the Map of Queensland Environmental Values (DETSI 2025d), which identifies the presence of a wetland of general ecological significance (GES) near the western boundary of the PL, as well as within its associated trigger area. However, the assessment concludes that neither the GES wetland nor its trigger area intersect the PL. Information requested: 3.1 Please clarify if the proposed activities will impact the GES wetland or the trigger area.	See Section 6.1.2 See Table 34 in Section 8
4) Groundwater quality – baseline data	The supporting information indicates that the target formation, the Upper Tinowon Sandstone, is not classified as a beneficial aquifer. This is due to its low permeability, which results in limited	See Section 6.1.4

Information requested	Detailed request	Section of the document where this is addressed
	groundwater yields. Additionally, water quality data reveals relatively high levels of salinity and fluoride within the formation. Furthermore, the presence of naturally occurring hydrocarbons further restricts the potential beneficial use of the groundwater. The GasFields Commission's report indicates that the connectivity between aquifers across the Surat, Bowen, and Galilee Basins is low. Within the Bowen Basin, water movement through the Tinowon Sandstone and other sandstone aquifers is believed to occur at a very slow rate, leading to prolonged groundwater residence times. As a result, these aquifer systems are expected to demonstrate significant delays in response to external stresses or impacts, as well as extended recovery periods. It is estimated that less than half of the fraccing fluid volume will be recovered upon completion of well stimulation. Furthermore, no baseline data has been provided to substantiate the assertion that the groundwater has no potential beneficial use. Given the slow movement of groundwater, it is critical to obtain reliable information on both its hydraulic conductivity and overall quality. <u>Information requested</u> 4.1 Further information/evidence is required to substantiate the claim that the Upper Tinwon Sandstone is not a beneficial aquifer. 4.2 Given the slow movement of groundwater, has any testing been conducted to determine the hydraulic conductivity or the residence time of the Upper Tinowon Sandstone? If so, please provide the results. 4.3 Has any sampling of groundwater (or produced water) been conducted? If so, please provide the results.	See Section 8 See Appendix E
5) Subterranean ecosystem	The application does not include any description or assessment of the subterranean ecosystem that could potentially be impacted by the proposed use of fraccing fluid for hydraulic stimulation. Subterranean ecosystems, which include groundwater-dependent ecosystems, stygofauna (aquatic organisms living in groundwater), and microbial communities, are highly sensitive and play a critical role in maintaining ecological balance and water quality. These ecosystems are often poorly understood and can be particularly vulnerable to disturbances, such as contamination or changes in water chemistry caused by the introduction of fraccing fluids. As such, the potential impacts of fraccing fluid on these ecosystems must be clearly identified, and appropriate mitigation measures proposed to minimise environmental harm. <u>Information requested</u> 5.1 Provide a risk assessment of potential impact of fraccing on the subterranean ecosystem.	See Section 6.1.4 Appendix E
6) Low hazard dam	It is noted that the proposed activities include construction of a 1.4ha low hazard dam for storage of flowback water. <u>Information requested</u> 6.1 Additional information is required on the calculation of the size of the dam. 6.2 Provide information on any treatment system to be employed for treatment and disposal. 6.3 Quantity and quality of flowback water expected following stimulation activities. 6.4 Method of disposal of treated/untreated flowback water. 6.5 Provide the GPS coordinates of the location of the dam.	See Section 7.3
7) Noise	There are two sensitive receptors located on the western side of PL1158, on Teelba Road. Both appear to be residential dwellings. It	See Section 6.5

Information requested	Detailed request	Section of the document where this is addressed
	is not known exactly how far these receptors are from the activity area. The acoustic profile is that of a rural setting which is likely to be significantly affected by the construction noise. The current EA includes a requirement to undertake a noise assessment prior to undertaking petroleum activities that are likely to impact a sensitive receptor. Additionally, there is a table (Schedule G: Table 1 — Noise Limits at Sensitive Receptors) that describes the noise limits that must not be exceeded unless there is an agreed alternative arrangement with the affected person. There have been petroleum activities undertaken on PL1158, it is not clear if there was any noise assessment conducted as per the EA condition. Information requested: 7.1 Please provide results of any noise monitoring undertaken to confirm that there will not be any impacts to sensitive receptors.	

2. Overview

OGT Energy has prepared this Supporting Information Report to accompany an Environmental Authority (EA) amendment application, submitted under Section 224 of the *Environmental Protection Act 1994* (EP Act), to the Department of the Environment, Tourism, Science, and Innovation (DETSI).

This amendment application concerns EA P-EA-100227919 (issued July 9, 2025) for Petroleum Lease 1158 (PL1158) (currently PL202 under the *Petroleum and Gas Act 1923*) relating to the Silver Springs Conventional Gas Project. This amendment to the Environmental Authority (EA) supports OGT's intention to conduct hydraulic fracture stimulation[1] (HFS) on future developed wells located within the PL1158 (PL202) tenure. The EA conditions will be aligned with the 'Streamlined model conditions for petroleum activities' (Model Conditions), with particular consideration given to the intended conventional gas production, as opposed to coal seam or unconventional gas production to which the Streamline Model Conditions are more specifically tailored.

The submission package for this specific EA amendment application comprises:

- Cover letter
- Application to amend an environmental authority
- Attachment 2 – Environmental Authority PL1158 (PL202) Amendment Application – Supporting Information Report (this document)

OGT has assessed the alternatives in relation to this amendment in Table 2. The option to undertake hydraulic fracture stimulation on PL 1158 (PL202) is the preferred option to maintain and increase production. Further, low hazard dams are the preferred option to large tanks due to the costs.

Table 2 Option Analysis

Option	Review of alternatives
Not Hydraulic Fracture Stimulate the wells	The PL1158 (PL202) field is in decline, drilling wells without hydraulic fracture stimulation is not feasible. In addition, under the proposed hydraulic fracture stimulation conditions no additional risk to sensitive receivers is foreseen.

[1] *OGT acknowledges the current EA does not permit hydraulic fracture stimulation, although its authorisation was originally governed by the 1923 Act and hydraulic fracture stimulation was part of field development to develop the Silver Springs conventional gas development. Unfortunately, approvals for hydraulic fracturing were not transferred during the transition to the new EA format. Therefore, OGT Energy is requesting a minor amendment to the present EA to enable further hydraulic fracture stimulation activities, noting that hydraulic fracturing has previously been conducted successfully within the Silver Spring Development.*

Option	Review of alternatives
Using tanks instead of dams for water storage and flowback	An assessment was undertaken by OGT between temporary tanks and developing dams for Hydraulic Fracture Stimulation. The disturbance footprint for the two options is similar. The temporary tanks at 10ML or 20ML are too expensive and were not feasible for the Project. Therefore, earthen dams are the preferred method for storage of water and flowback water.

3. Conventional Gas context

OGT propose to undertake hydraulic fracture stimulation within the conventional gas field of PL1158 (PL202). The field is also known as a tight gas field which relates to the low permeability of the reservoir. A conventional tight gas play is geologically and geochemically different to an unconventional Coal Seam Gas (CSG) play, of which Queensland has more popularly produced from in recent years. The differences relate to reservoir type, coal vs sandstones or shale and reservoir fluids, gas and water vs gas, condensate and small amounts of water.

A conventional gas well, including tight gas, has differing geological features and engineering techniques than CSG wells drilled within Queensland. Conventional gas extraction is well understood and has a significantly longer history of production than CSG. While some aspects are similar such as well construction, the reservoir mechanics and how the wells produce are quite different to CSG extraction. Conventional gas reservoirs, including tight gas are often found at much greater depths than CSG.

There are important distinctions between conventional and unconventional gas fields specifically in relation to the Model Conditions, that are tailored more specifically for unconventional CSG gas fields.

For context to support this EA amendment report, an explanatory note from Australian Petroleum Production and Exploration Association (APPEA) Report to the Council of Australian Governments (CoAG) Energy Council, titled “Unconventional Gas in Australia” in July 2016, outlines the following:

“Unconventional” gas is simply natural gas. Both “conventional” gas and “unconventional” gas are predominantly methane. CSG is almost pure methane whereas conventional gas may also contain ethane, propane, butane, and other longer carbon chain hydrocarbons sometimes including oil. In general, gas reserves are classified as “conventional” or “unconventional’ according to the geology of the resource:

- “Conventional” gas reservoirs largely consist of porous sandstone formations capped by impermeable rock, with the gas stored at high pressure. Australia’s remaining conventional gas reserves are largely (but not exclusively) offshore. Conventional gas usually flows to the production well and to the surface under pressure, though some wells need compression to flow. This type of production has historically been the source of most natural gas, hence the term “conventional”. Onshore conventional gas has been produced in many jurisdictions in Australia for decades. There is usually nill to minimal water production to begin with, with water production increasing over time as the reservoir becomes depleted.
- “Unconventional” gas reservoirs include coal seams, shale, and tight sandstone formations. These sorts of reservoirs tend to be low permeability and often comprise both the source of the gas and also the reservoir. CSG is found in coal seams where methane is bonded to the surface of coal particles and held there by water pressure. The technical term for this is ‘adsorption’. To extract CSG, water already in the coal seam, known as formation water, must be pumped out to reduce the reservoir pressure and release the gas. Shale gas and tight gas occur within rock formations that have extremely low permeability, making it difficult for gas to flow through the reservoir to the wells. Tight gas reservoirs, either shale or sandstone, often produce very little to no water throughout their producing life.

Different geologies can require different techniques to extract natural gas. While hydraulic fracturing is often associated with unconventional gas extraction, it was initially developed for conventional reservoirs to enhance production where the wellbore was damaged by drilling muds or cement. This was later brought to low permeability environments to increase production rates. Hydraulic fracturing was

initially not utilised in CSG and conventional gas production as wells were drilled in high permeability areas (to date only about 6 per cent of wells in Queensland have required hydraulic fracturing). As those high permeability areas are drilled out, hydraulic fracturing has been utilised to a higher degree to unlock additional reserves. For shale gas and tight gas wells, hydraulic fracturing, often in horizontal wells, is required to attain a commercial flow rate to increase the flow of gas from the reservoir.

Flowback recoveries are quite different between CSG and tight gas wells. Fracturing fluid recoveries from CSG wells are often high with the full frac load recovered along with the formation water required to depressurise the reservoir to allow gas to flow. Tight gas reservoirs rely on pressure depletion to drive the gas out of the reservoir often resulting in less than half of the fracturing fluid being recovered. The remaining fluid stays within the reservoir, often being taken up by clays within the sandstone matrix. This low recovery of frac fluid will usually result in an inability to meet the 150% recovery of frac fluid testing requirement. In addition, the frac fluid utilised has a high viscosity to allow sand to be placed within the formation. This viscosity makes the fluid unsuitable for many of the tests for some prescribed analytes.

4. Amendment Application Scope

This EA amendment application to OGT's PL1158 (PL202) is comprised of an amendment application and relevant supporting information for an amendment which includes:

1. An assessment of the current regulatory framework (as opposed to the 1923 Act) and the Conventional extraction of natural gas (as opposed to the more common unconventional, or Coal Seam Gas extraction) for hydraulic fracture stimulation.
2. An assessment of a low hazard dam to support the hydraulic fracture stimulation activities on PL1158 (PL202).
3. Update to Schedule A: Table 1 – Authorised Petroleum Activities of the EA to reflect the current Estimated Rehabilitation Cost (ERC) and include the construction of low hazard dams to support exploration and production activities.

4.1. Proposed conditions for amendment

This section provides OGTs requested conditions that align the with the hydraulic fracture stimulation Streamlined Model Conditions and is tailored to the conventional gas scenario. To support the proposed hydraulic fracture stimulation activities at PL1158 (PL202), OGT requests an update to Schedule A Table 1 to include a low hazard dam.

4.1.1. Proposed conditions

Proposed amendments have been highlighted in Table 3 and discussed in Section 4.2 below.

Table 3 Proposed New Conditions

Schedule	Section	Condition	
X - General	Authorised Petroleum Activities	(A1)	In the carrying out of the petroleum activity(ies), the holder of this environmental authority must not exceed the number and maximum size for each of the specified petroleum activities listed in Schedule A: Table 1 — Authorised Petroleum Activities for each petroleum tenure.

Schedule A: Table 1 Authorised Petroleum Activities

Petroleum Activity	Number of Existing Petroleum Activities	Number of Proposed Petroleum Activities	Maximum Area and Capacity (where applicable)
Seismic (kilometres)	0.0	0.0	0.0
Total wells	7	2	9.0 ha
Exploration Wells (indicative)	0	0	

Schedule	Section	Condition			
Appraisal Wells (indicative)			0	0	
Development Wells (indicative)			0	0	
Compressor Stations			0	0	
Regulated dams > 401 megalitres			0	0	
Regulated dams< 400 megalitres			0	0	
Low hazard dams			0	1	1.4 ha
Water treatment Facilities			0	0	
Brine Encapsulation Facilities			0	0	
Sewage Treatment Plants			0	0	
X - Stimulation Activities	Well drilling, completion and stimulation	(X1) Restricted stimulation fluids must not be used in stimulation. (X2) The holder of this environmental authority must ensure that polycyclic aromatic hydrocarbons are not added by design to stimulation fluids to be injected into the target gas producing formation. (X3) Oil-based drilling muds must not be used in the carrying out of the petroleum activity(ies). (X4) Synthetic based drilling muds must not be used in the carrying out of the petroleum activity other than with the written approval of the administering authority. (X5) Prior to undertaking well stimulation activities, the holder of this environmental authority must develop a risk assessment to ensure that stimulation activities are managed to prevent environmental harm. (X6) The stimulation risk assessment must include, but not necessarily be limited to: a) a process description of the stimulation activity to be applied, including equipment and a comparison to best international practice; b) provide details of where, when and how often stimulation is to be undertaken on the tenures covered by this environmental authority; c) a geological model of the field to be stimulated including geological names, descriptions and depths of the target gas producing formation(s); d) naturally occurring geological faults; e) seismic history of the region (e.g earth tremors, earthquakes); f) proximity of overlying and underlying aquifers; g) description of the depths that aquifers with environmental values occur, both above and below the target gas producing formation. h) identification and proximity of landholder bores in the area where stimulation activities are to be carried out; i) the environmental values of groundwater in the area; j) description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting and fracture propensity; k) consideration of barriers or known direct connections between the target gas producing formation and the overlying and underlying aquifers; l) a description of the well mechanical integrity testing program; m) process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc); n) practices and procedures to ensure that the stimulation activities are designed to be contained within the target gas producing formation; o) locations of landholders' active groundwater bores; p) groundwater transmissivity, flow rate, hydraulic conductivity and direction(s) of flow; q) a description of the chemicals used in stimulation activities (including estimated total mass, estimated composition, chemical abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation; r) a mass balance estimating the concentrations and absolute masses of chemicals that will be reacted, returned to the surface or left in the target gas producing formation subsequent to stimulation; (X7) an environmental hazard assessment of the chemicals used including their mixtures and the resultant chemicals that are formed after stimulation including:			

Schedule	Section	Condition
		a) toxicological and ecotoxicological information of chemicals used; b) information on the persistence and bioaccumulation potential of the chemicals used; c) identification of the stimulation fluid chemicals of potential concern derived from the risk assessment; d) an environmental hazard assessment of use, formation of, and detection of polycyclic aromatic hydrocarbons in stimulation activities; e) identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities; f) an environmental hazard assessment of leaving stimulation chemicals in the target gas producing formation for extended periods subsequent to stimulation; g) human health exposure pathways to operators and the regional population; h) risk characterisation of environmental impacts based on the environmental hazard assessment; i) potential impacts to landholder bores as a result of stimulation activities; and j) potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration. (X8) The stimulation risk assessment must be carried out for every well to be stimulated prior to stimulation activities being carried out at that well. (X9) Stimulation activities must not result in a change in water quality other than that within the stimulation impact zone of the target gas producing formation. (X10) Stimulation activities must not cause the connection of the target gas producing formation and another aquifer. (X11) The holder of this authority must ensure the internal and external mechanical integrity of the well system prior to and during stimulation such that there is: a) no significant leakage in the casing, tubing, or packer; and b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole. (X12) Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target gas producing formation and another aquifer. (X13) Rectification measures must be taken immediately if the holder of this environmental authority either becomes aware that stimulation activities have resulted in a change in water quality other than that within the stimulation impact zone of the target gas producing formation or that stimulation activities have caused the connection of the target gas producing formation and another aquifer.
X - Stimulation Activities	Stimulation baseline monitoring	(X14) Prior to undertaking any stimulation activity, the holder of this environmental authority must undertake a baseline bore assessment of the water quality of: a) all active landholders' groundwater bores (subject to access being permitted by the landholder) in any aquifer that is within 200 metres above or below the target gas producing formation and is spatially located with a two kilometre radius from the location of the stimulation initiation point; and b) any other bore that could potentially be adversely impacted by the stimulation activity(ies) in accordance with the findings of the risk assessment required by conditions (I7) and (I8). (X15) Prior to undertaking stimulation activities at a well, the holder of this environmental authority must have water quality data to represent the water quality in the target formation to be stimulated. The data must include as a minimum the results of analyses for the parameters in condition (I17). (X16) If water a water sample cannot be retrieved from the bore and there is limited or no data available for water quality condition (X8) Stimulation Risk Assessment shall be relied on. (X17) Baseline bore and target formation assessments must include relevant analytes and physico-chemical parameters to be monitored in order to establish baseline water quality and must include, but not necessarily be limited to: a) pH; b) electrical conductivity [S/m]; c) turbidity [NTU];

Schedule	Section	Condition
		d) total dissolved solids [mg/L]; e) temperature [°C]; f) dissolved oxygen [mg/L] g) dissolved gases (methane, chlorine, carbon dioxide, hydrogen sulfide) [mg/L]; h) alkalinity (bicarbonate, carbonate, hydroxide and total as $CaCO_3$) [mg/L]; i) sodium adsorption ratio (SAR); j) anions (bicarbonate, carbonate, hydroxide, chloride, sulphate) [mg/L]; k) cations (aluminium, calcium, magnesium, potassium, sodium) [mg/L]; l) dissolved and total metals and metalloids (including but not necessarily being limited to: aluminium, arsenic, barium, borate (boron), cadmium, chromium III, copper, iron, fluoride, lead, manganese, mercury, nickel, selenium, silver, strontium, tin and zinc) [ug/L]; m) total petroleum hydrocarbons [ug/L]; n) BTEX (as benzene, toluene, ethylbenzene, ortho-xylene, para-xylene, meta-xylene and total xylene) [ug/L]; o) polycyclic aromatic hydrocarbons (including but not necessarily being limited to: naphthalene, phenanthrene, benzo[a]pyrene) [ug/L]; p) sodium hypochlorite [mg/L]; q) sodium hydroxide [mg/L]; r) formaldehyde [mg/L]; s) ethanol [mg/L]; and t) gross alpha + gross beta or radionuclides by gamma spectroscopy [Bq/L].
X - Stimulation Activities	Stimulation Impact Monitoring Program	(X19) A Stimulation Impact Monitoring Program which has been certified by a suitably qualified person must be developed prior to the carrying out of stimulation activities. (X20) The Stimulation Impact Monitoring Program must be able to detect adverse impacts to water quality from stimulation activities and must consider the findings of the risk assessment required by conditions (I7) and (I8) that relate to stimulation activities and must include, as a minimum, monitoring of: a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used; and b) all bores in accordance with condition (I15). (X21) The Stimulation Impact Monitoring Program must provide for monitoring of: a) analytes and physico-chemical parameters relevant to baseline bore and well assessments to enable data referencing and comparison including, but not necessarily being limited to the analytes and physico-chemical parameters in condition (I17); and b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities including chemical compounds that are actually or potentially formed by chemical reactions with each other or coal seam materials during stimulation activities. (X22) The Stimulation Impact Monitoring Program must provide for monitoring of the bores in condition (I15) at the following minimum frequency: a) monthly for the first six months subsequent to the stimulation activities being undertaken; then b) annually for the first years subsequent to the stimulation activities being undertaken or until analytes and physico-chemical parameters listed in condition (I17(b)), (I17(m)) to (I17(t)) are not detected in concentrations above baseline bore monitoring data on two consecutive monitoring occasions. (X23) The holder of this environmental authority must implement the Stimulation Impact Monitoring Program. (X24) The results of the Stimulation Impact Monitoring Program must be made available to any potentially affected landholder upon request by that landholder.

4.1.2. Low Hazard Dam

P-EA-100227919 includes conditions for the development, operations and maintenance low hazard dams.

This amendment is to approve a low hazard dam to support OGTs hydraulic fracture stimulation program. The low hazard dam will be multipurpose and will be used to store water and KCl blend for hydraulic fracture stimulation. Once the hydraulic fracture stimulation is completed any flowback water would be stored in the dam until it can be disposed at a regulated waste facility.

This amendment is to include a low hazard dam to Condition A1, Schedule A: Table 1 – Authorised Petroleum Activities. OGT is planning to undertake hydraulic fracture stimulation across the PL 1158 (PL202) tenure. For the newly drilled wells Waggamba 6 and Waggamba 7 a low hazard dam is required for hydraulic fracture stimulation of these wells. The location of the low hazard dam to service both wells is provided in Figure 1 (subject to confirmation with Landowner). The low hazard dam has an estimated disturbance of 1.4 ha and is located to minimise impacts to the environment. The low hazard dam capacity is approximately 30ML and will be developed in accordance with the current P-EA-100227919 low hazard dam conditions.

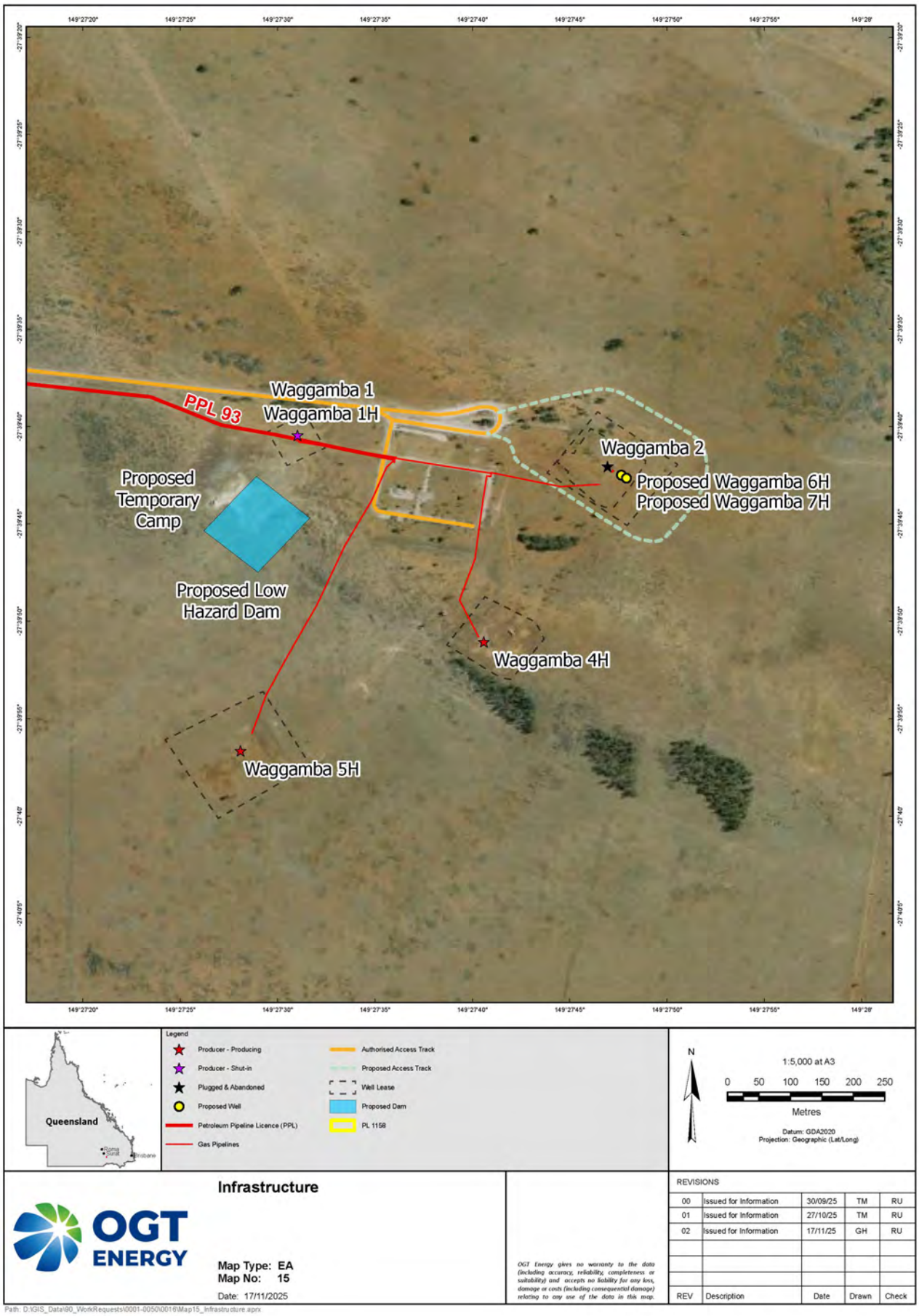

Figure 1 Proposed low hazard dam location

4.2. Amendment Rationale

4.2.1. Historic Hydraulic Fracture Stimulation and Approval history

PL 202 was awarded to Mosaic Oil Qld Pty Ltd. (Mosaic) in 2004. In November 2010, AGL Gas Storage Pty Ltd. and AGL Upstream Gas (MOS) Pty Ltd. (also referred to as AGL Energy) acquired the registered interests of Mosaic Oil which included PL202.

Subsequently, OGT acquired the Silver Springs and Wallumbilla LPG Projects near Roma from AGL Group. The acquisition was finalised in January 2025 and the transfer of ownership completed on March 26, 2025.

The tenure for PL202 expired on June 2, 2025 and an application for tenure renewal was lodged by AGL Energy on behalf of OGT May 7, 2025. A new tenure number, PL1158, was allocated for PL202.

The transfer of PL1158 (PL202) to OGT was registered on 10 June 2025 and P-EA-100227919 was issued on 11 June 2025.

OGT Energy acquired PL202 from AGL Energy in 2025, and subsequently de-amalgamated the tenure to create P-EA-100227919 for PL1158 (PL202) in July 2025 (thereby removing/closing PL202).

OGT acknowledges the current EA does not permit hydraulic fracture stimulation, although its authorisation was originally governed by the 1923 Act and hydraulic fracture stimulation was part of field development to develop the Silver Springs conventional gas development. Unfortunately, approvals for hydraulic fracturing were not transferred during the transition to the new EA format. Therefore, it is noted that hydraulic fracturing has previously been conducted successfully within the Silver Spring Development.

As indicated above, hydraulic fracturing has been utilised historically in the area by previous operators under the Petroleum and Gas Act 1923 approvals. These operations predated the Fracture Stimulation Conditions with the operations conducted as part of normal petroleum activities. The wells that OGT is aware of on the public register include:

- Churchie 1 (Mosaic Oil on May 24, 2010, Appendix A)
- Namarah 2 (Oil Company of Australia, now Origin, on September 3, 1987).

While not specifically in PL1158 (PL202) the reservoirs within the Silver Springs Development targeted are at similar depths and in similar geological conditions as those found in PL1158 (PL202) this is discussed further in Section 7.2.1.

4.2.2. Amendment for Hydraulic Fracture Stimulation Conditions

OGT is proposing an amendment to be able to hydraulic fracture the conventional gas tenure PL1158 (PL202). Hydraulic fracture stimulation is required to produce meaningful volumes of natural gas from PL1158 (PL202) tenure as well as extending the life of the tenure to take advantage of the existing infrastructure to get gas to market. This strategy aligns with the Queensland Governments energy policy to utilise natural gas a transition fuel to reduce Queensland's carbon footprint.

It is important to note as discussed in Section 3 that conventional gas is different to unconventional gas (CSG) and therefore, the hydraulic fracture stimulation conditions need to be fit for purpose. The key changes to the model conditions for hydraulic fracture stimulation are detailed in Table 4 below.

Table 4 Amendment Rationale

Schedule	Condition	Rationale
X - Stimulation Activities **Section:**	(X1) Restricted stimulation fluids must not be used in stimulation. (X2) The holder of this environmental authority must ensure that polycyclic aromatic hydrocarbons are	No changes to Well drilling, completion and stimulation

Schedule	Condition	Rationale
Well drilling, completion and stimulation	not added by design to stimulation fluids to be injected into the target gas producing formation. (X3) Oil-based drilling muds must not be used in the carrying out of the petroleum activity(ies). (X4) Synthetic based drilling muds must not be used in the carrying out of the petroleum activity other than with the written approval of the administering authority. (X7) Prior to undertaking well stimulation activities, the holder of this environmental authority must develop a risk assessment to ensure that stimulation activities are managed to prevent environmental harm. (X8) The stimulation risk assessment must include, but not necessarily be limited to: a) a process description of the stimulation activity to be applied, including equipment and a comparison to best international practice; b) provide details of where, when and how often stimulation is to be undertaken on the tenures covered by this environmental authority; c) a geological model of the field to be stimulated including geological names, descriptions and depths of the target gas producing formation(s); d) naturally occurring geological faults; e) seismic history of the region (e.g earth tremors, earthquakes); f) proximity of overlying and underlying aquifers; g) description of the depths that aquifers with environmental values occur, both above and below the target gas producing formation. h) identification and proximity of landholder bores in the area where stimulation activities are to be carried out; i) the environmental values of groundwater in the area; j) description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting and fracture propensity; k) consideration of barriers or known direct connections between the target gas producing formation and the overlying and underlying aquifers; l) a description of the well mechanical integrity testing program; m) process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc); n) practices and procedures to ensure that the stimulation activities are designed to be contained within the target gas producing formation; o) locations of landholders' active groundwater bores; p) groundwater transmissivity, flow rate, hydraulic conductivity and direction(s) of flow; q) a description of the chemicals used in stimulation activities (including estimated total mass, estimated composition, chemical	

Schedule	Condition	Rationale
	abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation; r) a mass balance estimating the concentrations and absolute masses of chemicals that will be reacted, returned to the surface or left in the target gas producing formation subsequent to stimulation; s) an environmental hazard assessment of the chemicals used including their mixtures and the resultant chemicals that are formed after stimulation including: r) toxicological and ecotoxicological information of chemicals used; s) information on the persistence and bioaccumulation potential of the chemicals used; i. identification of the stimulation fluid chemicals of potential concern derived from the risk assessment; ii. an environmental hazard assessment of use, formation of, and detection of polycyclic aromatic hydrocarbons in stimulation activities; iii. identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities; t) an environmental hazard assessment of use, formation of, and detection of polycyclic aromatic hydrocarbons in stimulation activities u) identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities v) an environmental hazard assessment of leaving stimulation chemicals in the target gas producing formation for extended periods subsequent to stimulation; w) human health exposure pathways to operators and the regional population; x) risk characterisation of environmental impacts based on the environmental hazard assessment y) potential impacts to landholder bores as a result of stimulation activities; and z) an assessment of cumulative underground impacts, spatially and temporally of the stimulation activities to be carried out on the tenures covered by this environmental authority; and aa) potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration. (X9) The stimulation risk assessment must be carried out for every well to be stimulated prior to stimulation activities being carried out at that well. (X10) Stimulation activities must not result in a change in water quality other than that within the stimulation impact zone of the target gas producing formation.	

Schedule	Condition	Rationale
	(X11) Stimulation activities must not cause the connection of the target gas producing formation and another aquifer. (X12) The holder of this authority must ensure the internal and external mechanical integrity of the well system prior to and during stimulation such that there is: a) no significant leakage in the casing, tubing, or packer; and b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole. (X13) Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target gas producing formation and another aquifer. (X14) Rectification measures must be taken immediately if the holder of this environmental authority either becomes aware that stimulation activities have resulted in a change in water quality other than that within the stimulation impact zone of the target gas producing formation or that stimulation activities have caused the connection of the target gas producing formation and another aquifer.	
X - Stimulation Activities **Section:** Stimulation baseline monitoring	(X15) Prior to undertaking any stimulation activity, the holder of this environmental authority must undertake a baseline bore assessment of the water quality of: ~~a) all active landholders' groundwater bores (subject to access being permitted by the landholder) that are spatially located within a two kilometre horizontal radius from the location of the stimulation initiation point within the target gas producing formation; and~~ b) all active landholders' groundwater bores (subject to access being permitted by the landholder) in any aquifer that is within 200 metres above or below the target gas producing formation and is spatially located with a two kilometre radius from the location of the stimulation initiation point; and c) any other bore that could potentially be adversely impacted by the stimulation activity(ies) in accordance with the findings of the risk assessment required by conditions (I7) and (I8). (X16) Prior to undertaking stimulation activities at a well, the holder of this environmental authority must have ~~sufficient~~ water quality data to ~~accurately~~ represent the water quality in the target formation well to be stimulated. The data must include as a minimum the results of analyses for the parameters in condition (I17). (X17) If water a water sample cannot be retrieved from the bore and there is limited or no data available for water quality condition (X8) Stimulation Risk Assessment shall be relied on.	OGT proposes to remove X15 (a) Condition X15 (a) is not required as it is duplicated in X15 (b). X15 (b) deals with both the horizontal and vertical spatial distances from landowner bores: • The stimulation risk assessment under the Environmental Authority considers the hazard identification and exposure pathways including the scenarios of stimulation fluids remaining in the formation post stimulation. • In addition, the stimulation risk assessment considers the persistence and toxicity of the chemicals used for stimulation that feeds into the overall risk assessment. OGT proposes to amend X16 and X17 and add a new X17: • Conventional wells when drilled do not produce water, there is not sufficient water to sample within the bore. • Potentially (not guaranteed), there may be water that can be sampled within the region from the target formation (from late in life wells that have watered up). It is important to note that there is no separator used at conventional wells. Therefore, any water entering the gathering system will be co-mingled with other water from the OGT tenure until it reaches the Silver Spring Facility.

Schedule	Condition	Rationale
		• If water is available in the system, it will give a representative sample. There is no guarantee that target formation water will be available and may need to rely on historical data (if available). • The changes to X16 take into account the issues of lack of water from the well, but also meets the intent of understanding of the water within the target formation. • The addition of X17 allows the proponent to stay in compliance if there is no water in the bore, there is no existing information held by the company. The risk assessment is the science-based evidence to understand the target formation and assess the risk associated to that formation from stimulation.
	(X18) Baseline bore and ~~well~~ target formation assessments must include relevant analytes and physico-chemical parameters to be monitored in order to establish baseline water quality and must include, but not necessarily be limited to: a) pH; b) electrical conductivity [□S/m]; c) turbidity [NTU]; d) total dissolved solids [mg/L]; e) temperature [°C]; f) dissolved oxygen [mg/L] g) dissolved gases (methane, chlorine, carbon dioxide, hydrogen sulfide) [mg/L]; h) alkalinity (bicarbonate, carbonate, hydroxide and total as CaCO3) [mg/L]; i) sodium adsorption ratio (SAR); j) anions (bicarbonate, carbonate, hydroxide, chloride, sulphate) [mg/L]; k) cations (aluminium, calcium, magnesium, potassium, sodium) [mg/L]; l) dissolved and total metals and metalloids (including but not necessarily being limited to: aluminium, arsenic, barium, borate (boron), cadmium, chromium III, copper, iron, fluoride, lead, manganese, mercury, nickel, selenium, silver, strontium, tin and zinc) [g/L]; m) total petroleum hydrocarbons [g/L]; n) BTEX (as benzene, toluene, ethylbenzene, ortho-xylene, para-xylene, meta-xylene and total xylene) [□g/L]; o) polycyclic aromatic hydrocarbons (including but not necessarily being limited to: naphthalene, phenanthrene, benzo[a]pyrene) [□g/L]; p) sodium hypochlorite [mg/L]; q) sodium hydroxide [mg/L]; r) formaldehyde [mg/L]; s) ethanol [mg/L]; and t) gross alpha + gross beta or radionuclides by gamma spectroscopy [Bq/L].	
	(X19) A Stimulation Impact Monitoring Program which has been certified by a suitably qualified person must	

Schedule	Condition	Rationale
X - Stimulation Activities **Section**: Stimulation Impact Monitoring Program	be developed prior to the carrying out of stimulation activities. (X20) The Stimulation Impact Monitoring Program must be able to detect adverse impacts to water quality from stimulation activities and must consider the findings of the risk assessment required by conditions (I7) and (I8) that relate to stimulation activities and must include, as a minimum, monitoring of: a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used; and ~~) flow back waters from stimulation activities at sufficient frequency to:~~ ~~i. sufficiently represents the quality of the fluids used and which sufficiently represents the quality of that flow back water; and~~ ~~ii. Accurately demonstrate that 150 percent of the volume used in stimulation activities has been extracted from the stimulated well or produced water~~ b) all bores in accordance with condition (I15). (X21) The Stimulation Impact Monitoring Program must provide for monitoring of: a) analytes and physico-chemical parameters relevant to baseline bore and well assessments to enable data referencing and comparison including, but not necessarily being limited to the analytes and physico-chemical parameters in condition (I17); and b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities including chemical compounds that are actually or potentially formed by chemical reactions with each other or coal seam materials during stimulation activities. (X22) The Stimulation Impact Monitoring Program must provide for monitoring of the bores in condition (I15) at the following minimum frequency:	OGT proposes to remove X20 (b) (i) and (ii): • Due to the nature of conventional wells, produce water does not occur until the end of life of the well. This is due to the low permeability of the target formation, there is very little water movement. In conventional wells, 150% of the flowback water extracted will never occur. • The target formation is deep, is not permeable (hence fracture stimulation, the gas molecules are restricted through the target formation). The historic water quality from this formation, where available shows it is saline. Therefore, this formation will not be used as a water resource. • There is no Environmental Values in the target formation and no pathways to receptors with the fluid remaining in the target formation. The remaining flowback fluid will not migrate from the formation as it is locked in the formation. It will never be produced to surface and highly unlikely to move from the zone of impact. The stimulation risk assessment under the Environmental Authority considers the hazard identification and exposure pathways including the scenarios of stimulation fluids remaining in the formation post stimulation. In addition, the stimulation risk assessment considers the persistence and toxicity of the chemicals used for stimulation that feeds into the overall risk assessment.

Schedule	Condition	Rationale
	a) monthly for the first six months subsequent to the stimulation activities being undertaken; then b) annually for the first years subsequent to the stimulation activities being undertaken or until analytes and physico-chemical parameters listed in condition (I17(b)), (I17(m)) to (I17(t)) are not detected in concentrations above baseline bore monitoring data on two consecutive monitoring occasions. (X23) The holder of this environmental authority must implement the Stimulation Impact Monitoring Program. (X24) The results of the Stimulation Impact Monitoring Program must be made available to any potentially affected landholder upon request by that landholder.	

4.2.3. Amendment for Low Hazard Dams

OGT is proposing a to include the construction of a low hazard dam to Condition A1, Schedule A: Table 1 – Authorised Petroleum Activities. The low hazard dam is required to support the HFS activities. The low hazard dam will be approximately 100 m long and 100 wide, and up to 3 metres deep with a total footprint of 1.4ha and a capacity of 30 ML.

OGT has also investigated the use of temporary lined tanks to store HFS water and flowback water. That investigation showed that the use of tanks, including the mobilisation, set up, rental costs, demobilisation and liner disposal was cost prohibitive.

In addition, temporary tanks have long lead times, which doesn't assist OGT to be a nimble operator to develop gas to market. Low hazard dams can be organised quickly with local contractors, they are ideal for storage of flowback water, allowing reuse and eventual removal of remaining fluid for suitable management and disposal. Once emptied, they can be rehabilitated and the area reused.

5. Site Background and Context

5.1. Site information

PL1158 (PL202) is located 70km southeast of Surat Township and approximately 45km due east of the Silver Springs Gas Plant (SSP). PL1158 (PL202) encompasses the Waggamba gas/condensate field and can be seen in Figure 2.

As shown in Figure 2, PL1158 (PL202) is connected via Petroleum Pipeline Licence (PPL) 93 pipeline that runs from the site of Waggamba 1H to a tie-in point at the Taylor Plant which then connects to the Silver Springs Plant on (PL446). Table 5 provides the tenure information relevant to PL1158 (PL202).

Table 5 Tenure Summary

Lease	EA#	Mining District	Grant Date	Renewal Date	Permit Expiry	Ownership	Field Name
PL1158 (PL202)	P-EA-100227919	Dalby	Tenure renewal lodged on 07/05/2025 Approval pending.			OGT	Waggamba

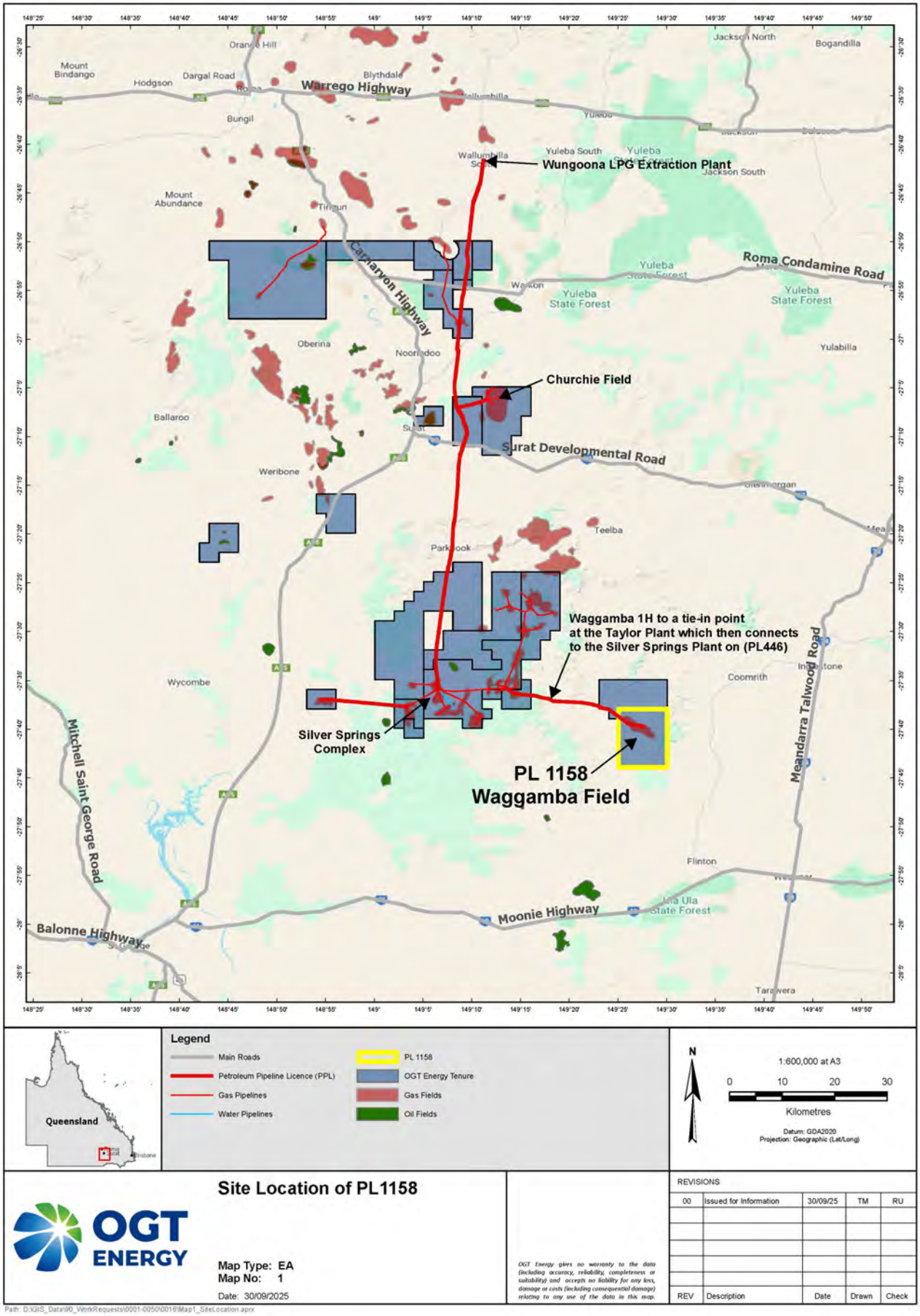

Figure 2 OGT Energy PL 1158 Location

5.2. Exploration and Appraisal History

Waggamba-1 was drilled by Bridge Oil Ltd. in late 1981. This well discovered gas and oil in the Permian Tinowon Formation. Due to relatively poor production performance, no follow-up drilling occurred until 2004 when Mosaic drilled two vertical under-balanced wells.

In 2006, Mosaic drilled an under-balanced side-track from Wagammba-1. This well was intended to be a near horizontal open-hole completion. However, borehole problems meant drilling ended prematurely and the hole angle only reached 67 degrees. Mosaic performed several in-depth studies before redesigning the drilling program. Waggamba-4H and Waggamba-5H were drilled in 2008, in a north/northeast orientation, 90 degrees to Wagggamba-1H.

Multiple studies have been performed on the Waggamba Field. HFS is generally considered to have to the best chance of unlocking the resources available in this field.

Geologically, the wells to date have been drilled on a subtle stratigraphic trap within the Surat-Bowen Basin.

Existing infrastructure for PL1158 (PL202) includes two (2) producing wells, detailed below;

- Waggamba-4H
- Waggamba-5H

The existing and proposed wells are presented in Table 6. It is noted that there are 2 shut-in wells and three (3) plugged and abandoned (P&A) wells.

Table 6 Current PL1158 (PL202) wells and well status

Well name	Well Status
Waggamba-1H	Shut-in
Waggamba-2	P&A
Waggamba-3	Shut-in
Waggamba-4H	Producing
Waggamba-5H	Producing
Waggamba-6H	Proposed well
Waggamba-7H	Proposed well
Mamaree-2	P&A
Meribah-1	P&A

5.3. Geology

The Waggamba Field is situated in the southern Surat Basin, Queensland, designated as PL 1158 in Figure 2. It focusses on producing from an anticlinal structural trap of the Permian Tinowon Sandstone Reservoir (within the Bowen Basin). Figure 3 provides an overview of the stratigraphy of the Surat and Bowen Basins.

The Surat Basin trends north-south and is an asymmetric, intra-cratonic basin located in central-southern Queensland. It is overlain by a mildly deformed Jurassic-Cretaceous sequence up to 2,500 m thick. The Surat Basin sequence unconformably overlies the Taroom Trough, a thick Permo-Triassic unit that forms the southern sub-surface extension of the exposed northern Bowen Basin. The axis of the Mimosa Syncline within the Surat Basin is aligned with the underlying Taroom Trough. The Waggamba field is positioned on the western flank of the Late Carboniferous-Triassic Bowen Basin, which is unconformably covered by the Jurassic-Cretaceous Surat Basin.

Gas indications have been recorded in the Late Permian Wallabella Sandstones, and the Triassic Showgrounds Sandstone and Rewan Formations, well below the Walloon Coal Measures (the focus of CSG industry).

The Waggamba Field is located within the Late Permian Tinowon sandstone fairway, a region associated with established gas prospects to the north and west of the field. The Tinowon Formation consists mainly of tight to moderate quality fluvial sandstones deposited in a lower coastal plain setting with interbedded coals, siltstone, and mudstone. Shales and siltstone act as lateral and basal seals for the Tinowon coals, Basement, and Timbury Hill Formation. Most traps found in the Tinowon Formation are a result of combined structural and stratigraphic factors.

At the Waggamba area, the Tinowon Formation primarily comprises clastic material, including fluvial deposits, paralic coal measures, restricted and open marine shales, and frequent tuffs, typically overlying granites, metasediments, and volcanics.

In this area, shoreface sandstones (medium to fine-grained, occasionally coarse) within the Tinowon Formation serve as productive zones across three levels: Upper Tinowon and Lower Tinowon Sandstone ("A2" and "A1" sand), separated by a substantial coal interval (Wallabella coal member). The coal layer may be 10-15 metres thick and often includes an Intra Wallabella Sandstone sequence. These Permian coals have reached maturity for oil and gas generation and are considered the source for many conventional clastic reservoirs in the stratigraphic column. The total thickness of the Tinowon Formation can reach up to 100 m.

To date, seven wells have been drilled to delineate the boundaries of the Waggamba field.

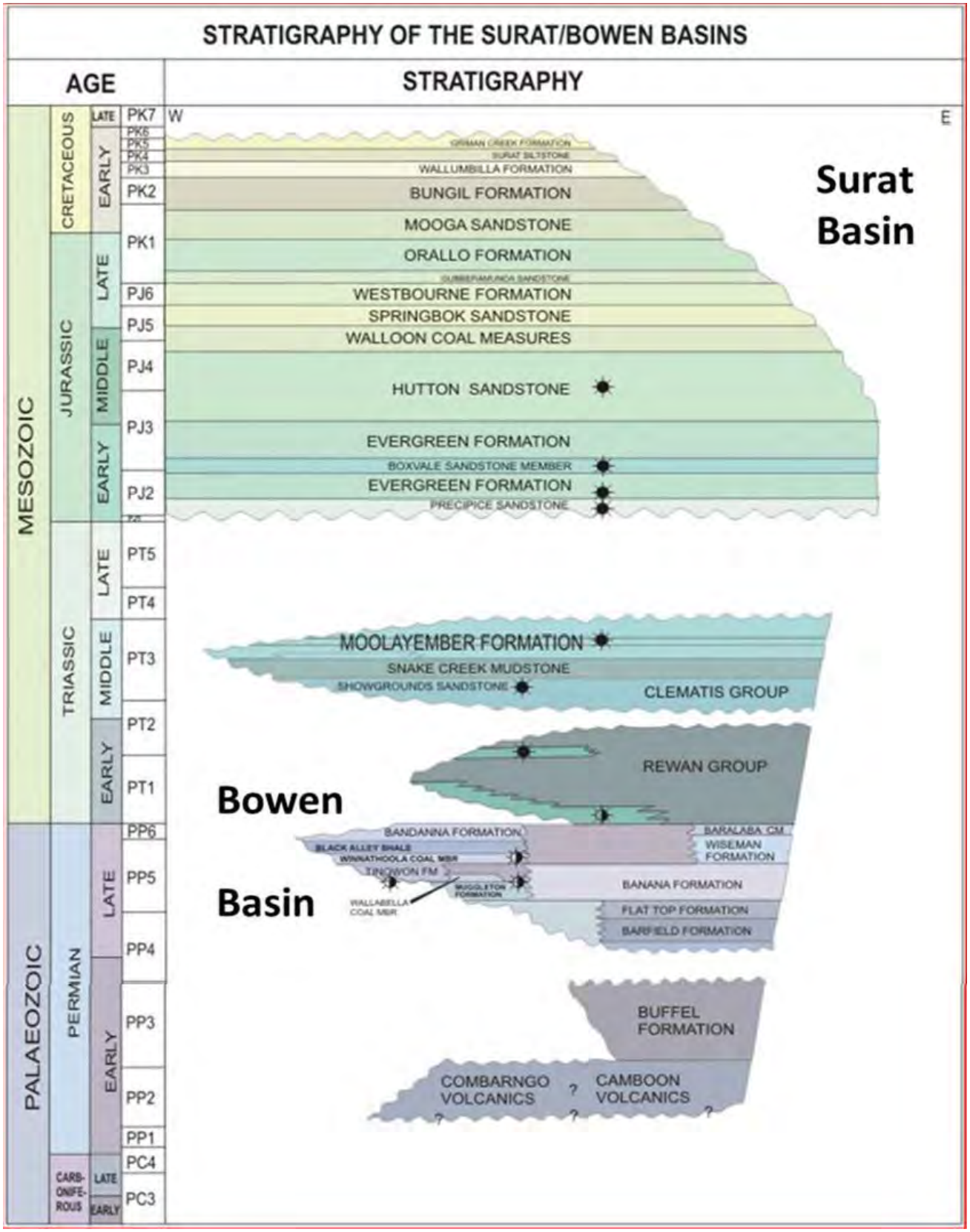

Figure 3 Stratigraphy in the Surat/Bowen Basins

5.4. Hydrogeology

The Waggamba field, is focussed on a gas resource within the Bowen Basin, which underlies the Surat Basin in this location. However, the surface site of the gas field is located in the Great Artesian Basin (GAB) (see Figure 4). The GAB is a multi-layered sedimentary system that was deposited during the Mesozoic era (225 to 60 million years ago). The depositional environments with the basin shifted from fluvial to lacustrine and swamps several times. Within the Surat Basin these changes have resulted in deposition of the fluviatile aquifer sandstones such as the Mooga Sandstone, Gubberamunda Sandstone, Springbok Sandstone, Hutton Sandstone and Precipice Sandstone and fine-grained confining layers such as the Evergreen Formation and Westbourne Formation. The shift from fluvial depositional environments to lakes and swamps allowed the organic matter that would become the coal seams in the Walloon Sub-Group to develop.

The GAB can be divided into five major sedimentary basins based on ridges in the basement (Habermehl 1980). These basins are:

- Eromanga Basin
- Surat Basin
- Carpentaria Basin
- Bowen Basin
- Galilee Basin

All of the major recognised GAB aquifer and confining units for the Surat Basin have been identified in the drilling logs near the Silver Springs and Waggamba gas fields. The main GAB aquifers intersected by the Waggamba-6H and 7H wells in descending vertical depth are summarised in Table 7.

Table 7 Aquifers Intersected by Waggamba-6H and 7H Wells

Name	Vertical Depth (m)	Depth Interval (m)
Mooga	649.9	649.9
Gubberamunda	901.3	292.3
Springbok	1,193.6	296.9
Hutton	1,490.5	237.2
Boxvale	1,727.7	251.4

Regionally, groundwater movement within the Surat Basin is primarily influenced by the shallowly dipping nature of the sedimentary layers, variations in hydraulic conductivity, and structural features. Under existing hydraulic heads, groundwater generally flows along the bedding planes and layer boundaries toward the centre of the basin.

Overall, connectivity between aquifers across the Surat, Bowen, and Galilee Basins is low (Gasfields Commission Queensland, 2014; CSIRO, 2012a, 2012b; Marsh et al., 2008; QWC, 2012; RPS, 2012). Within the Bowen Basin, water movement through the Tinowon and other sandstone aquifers is inferred to be very slow, resulting in long groundwater residence times. Consequently, the system is expected to exhibit substantial lag and recovery times in response to stresses or impacts (IESC, 2014). This is discussed further in Appendix A .

Groundwater from the Lower Cretaceous to Jurassic aquifers of the Surat Basin (ranging from the Mooga Formation to the Boxvale Formation) typically has salinity levels between 500 and 1,500 mg/L total dissolved solids, with pH values from 7.5 to 8. In recharge zones, groundwater is generally of low salinity and slightly acidic, transitioning from calcium-magnesium-bicarbonate-chloride-type water to sodium-bicarbonate-chloride-type water toward discharge areas (IESC, 2014).

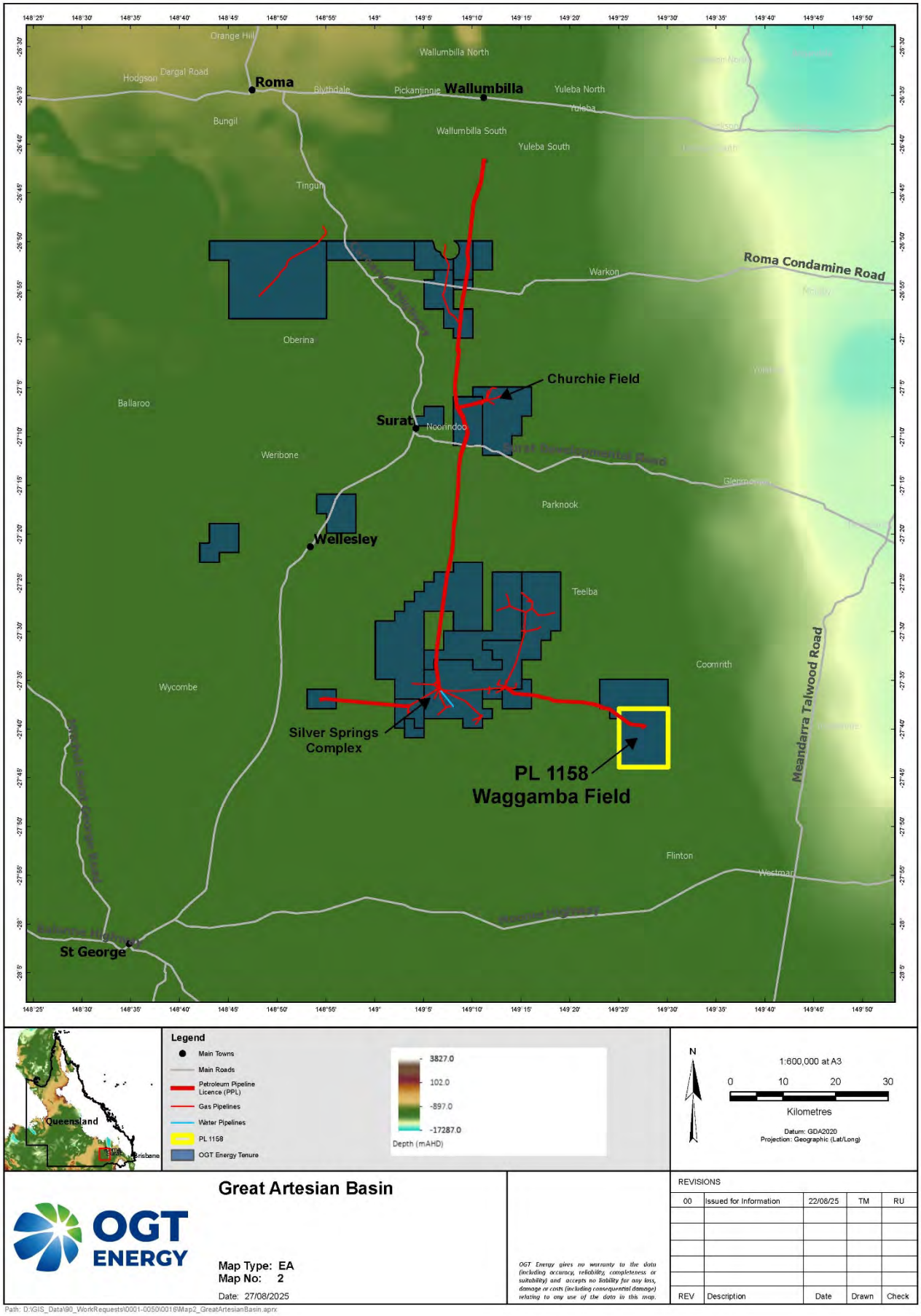

Figure 4 Location of Field to the Great Artesian Basin (GAB)

Across the project area, the early Triassic Rewan Formation forms a semi-pervious boundary separating the Lower Cretaceous to Jurassic aquifers of the Surat Basin from those of the Bowen Basin. The Rewan Group consists mainly of lithic sandstone, mudstone, shale, siltstone, and minor quartz sandstone. Extensive silicification and clay alteration have significantly reduced its porosity and permeability, preventing the development of large aquifers within this sequence (Gasfields Commission Queensland, 2014).

5.5. Community

PL1158 (PL202) is situated near the boundary between the Maranoa and Western Downs regions. This area is characterised by sparse rural settlement with limited residential presence. The nearest towns are Surat, located 70km north-west and St. George, located 96 km south-west of the site.

Land use includes:

- Extensive sheep and cattle grazing, particularly dominant in Maranoa
- Transitioning to more diversified agriculture in Western Downs
- Dryland cropping and some irrigated farming occur, with Western Downs supporting large-scale grain production while Maranoa remains primarily pastoral.
- Resource extraction, including gas and energy infrastructure, is present intermittently across both regions, subject to planning controls and environmental buffer zones.

5.6. Stakeholders

Table 8 details all interested stakeholders including:

- Government agencies
- Non-Government organisations and utilities
- Landholders and Mineral Rights Holder
- Traditional Owners
- Interested Stakeholders.

Table 8 Stakeholder List

Stakeholder Group	Organisation/Agency
Government agencies	Maranoa Regional Council / Western Downs Regional Council
	Department of Environment, Tourism, Innovation and Science
	Department of Resources
	Department of Transport and Main Roads
	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
	Queensland Fire and Emergency Services
	Commonwealth Department of Climate Change, Environment, Energy and Water
Non-Government organisations and utilities	Telstra
	AgForce
	Dawson Valley Development Association Inc.
	Jemena
	Ergon Energy
	AGL
Landholders and mineral rights holders	The number of landholders within PL1158 (PL202) is too many to list. Details can be given on request.
Traditional owners	In Maranoa Regional Council: • Gunggari (or Kunggari) and Mandandanji (or Mandandanyi) peoples

Stakeholder Group	Organisation/Agency
	• Wester Downs Regional Council area - Barunggam, Iman (Yiman), Bigambul, Wakka Wakka, and Jarowair peoples

6. Environmental Values

The environmental values (EVs) present within PL1158 (PL202) have been described in this section to inform the assessment of direct, indirect and cumulative impacts. EVs are described in the EP Act to include:

- A quality of physical characteristic of the environment that is conducive to ecological health or public amenity or safety (environmental value); or
- Another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation (prescribed environmental value).

To support this assessment Boobook Ecological Consulting, undertook an environmental assessment report (EAR) in 2025. This was a desktop assessment to describe the potential ecological values and constraints within PL1158 (PL202), and included:

- A review of relevant environmental databases, technical reports, maps and legislation
- Identification and /or likelihood of Environmentally Sensitive Areas (ESAs) under the EP act, Matters of National; Environmental Significance MNES), matters of State Environmental Significance (MSES) threatened fauna and flora, regional ecosystems (SEs) and weeds occurring with and surrounding the PL.

The following sections summarise the EVs that are present, or are potentially present on PL1158 (PL202):

6.1. Watercourses, wetlands and springs and river improvement trust areas

6.1.1. Surface water

PL 1158 (PL202) is wholly within the Border rivers and Moonie surface water catchment as shown in Figure 5.

The main watercourse within PL1158 (PL202) is Teelba Creek, to the west of the PL, which drains into the Moonie River (part of the Murray Darling Basin). There are a number of other mapped streams which are tributaries of the Teelba Creek, including Black Camps Creek, which drains the northwest of PL1158 (PL202) (Figure 6).

The following surface water conditions were noted within the surveyed area:

- There are no watercourses classified as High Ecological Value Waters (as identified in Schedule 22 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 present
- The watercourses present to the west and north are mapped with fish passage attributes, as defined by the Fisheries Act 1994 They are major (4) to the southwest, high (3) to the west and moderate (2) and low (1) to the northwest.

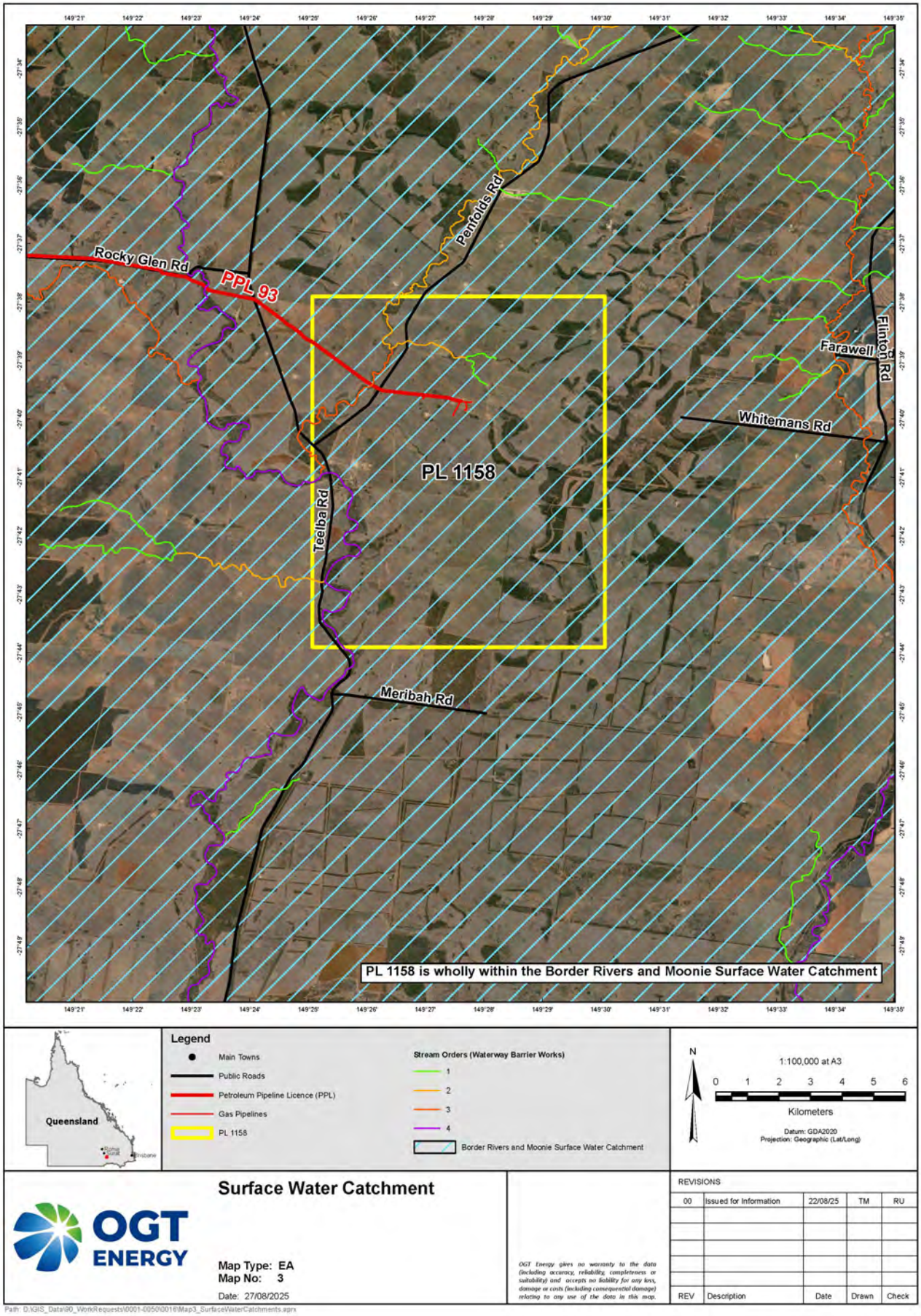

Figure 5 PL 1158 Surface Water Catchment

6.1.2. Wetlands

An assessment of the wetland conditions within the surveyed area undertaken by Boobook Ecological Consulting 2025, is summarised below (Figure 6):

- There are no prescribed RE that intersect a wetland is mapped on the vegetation management wetlands map
- There are no mapped Wetland Protection Areas (WPA) or Wetlands of High Ecological Significance (HES).
- One Wetland of General Ecologically Significance (GES), as shown on a Map of Queensland Wetland Environmental Values (DETSI 2025d), occurs to the western boundary of the PL as does its trigger area. However, the proposed activities are 4 km east of the trigger area therefore no GES or trigger areas are intersected.
- There are no mapped springs as defined in Schedule 4 of the Water Act.

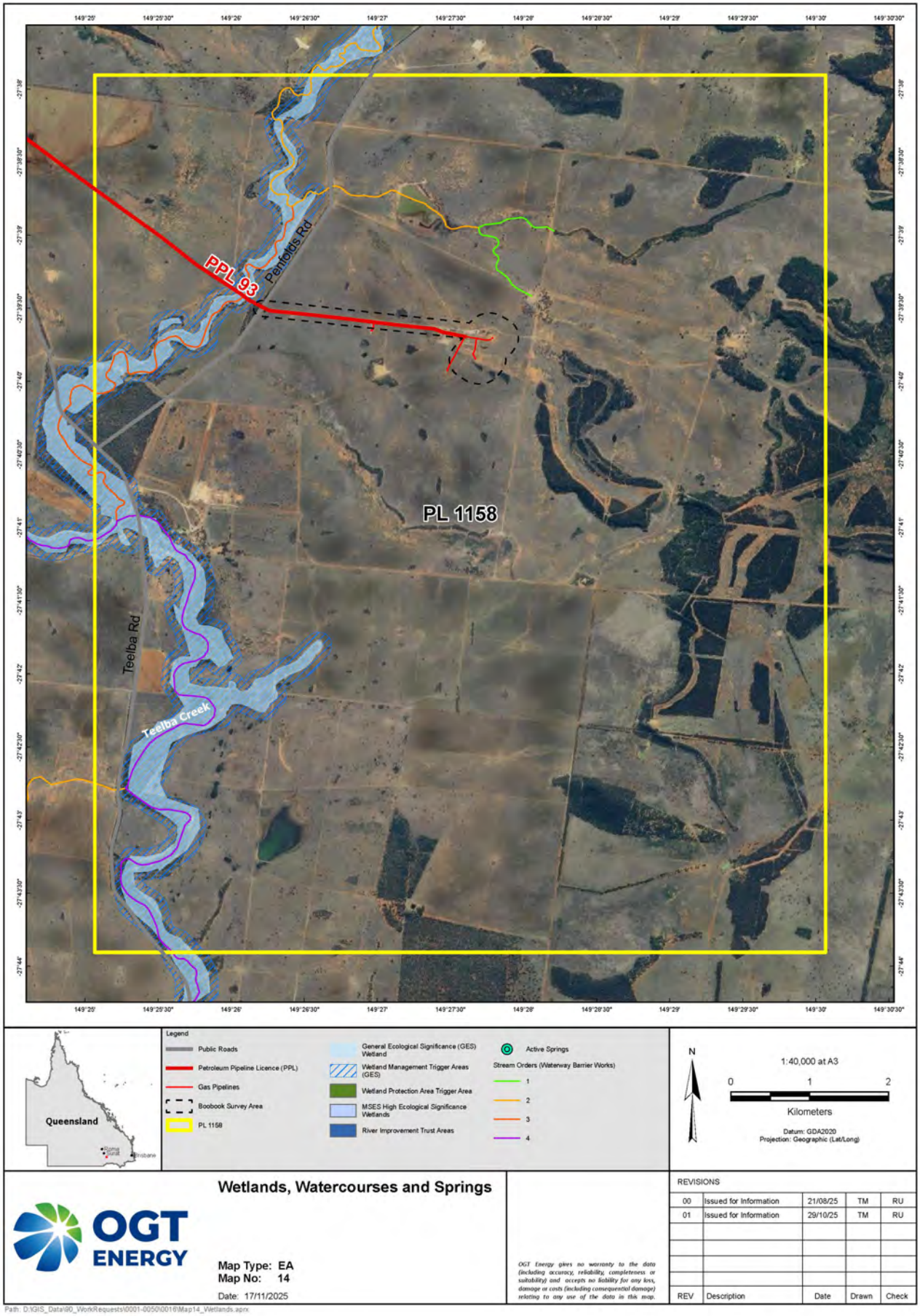

Figure 6 PL 1158 Wetlands, watercourses and springs

6.1.3. Surface water use

Water use within the Surat Basin is widespread, with the main uses being stock water, irrigation and domestic consumption.

The most sensitive human value identified is the protection of drinking water quality and the water quality standards that apply to the assessment of this value are the Australian Drinking Water Guidelines. To avoid and/or minimise impacts to surface waters, management strategies will be implemented that are consistent with those that have been previously implemented for adjacent OGT lease areas. These management actions are to be in compliance with the relevant Model Conditions proposed to be adopted as part of this EA Amendment application and have been successful in management the stimulation activities in adjacent leases without incident.

6.1.4. Groundwater

6.1.4.1. Formations Containing Groundwater

Groundwater is present throughout the formations intersected. During the drilling of the wells, groundwater bearing formations are isolated by pressure cementing the casing. Therefore, the only formation where environmental values require protecting from the proposed activities is within the target formation for PL1158 (PL202), the Upper Tinowon Sandstone (Table 9).

6.1.4.2. Target gas producing formations

The Upper Tinowan Sandstone (Late Permian sandstone) is the focus of the proposed activity and are in the Bowen Basin, below the aquifers of the GAB in the overlying Surat Basin. The target formation is not considered a beneficial aquifer due to the low permeability and associated low groundwater yields as described by EMM in Appendix E . Water quality data from the Bowen Basin (State of Queensland 2020) indicates groundwater with relatively high salinity and high fluoride. In additions, beneficial use of the groundwater is limited by the presence of naturally occurring hydrocarbons in the formation. Water quality of the formation is further discussed in Appendix E by EMM consulting.

As described above, during the drilling of the wells, other formations including potential aquifers are isolated by pressure cementing the casing. A typical well construction in PL1158 (PL202) is shown in Figure 7 which shows the isolation of aquifers. This eliminates the risk of interconnection between higher aquifers in the Surat Basin that have been drilled through. The proposed activities of fracture stimulation will be limited to target formation with no other formations being affected.

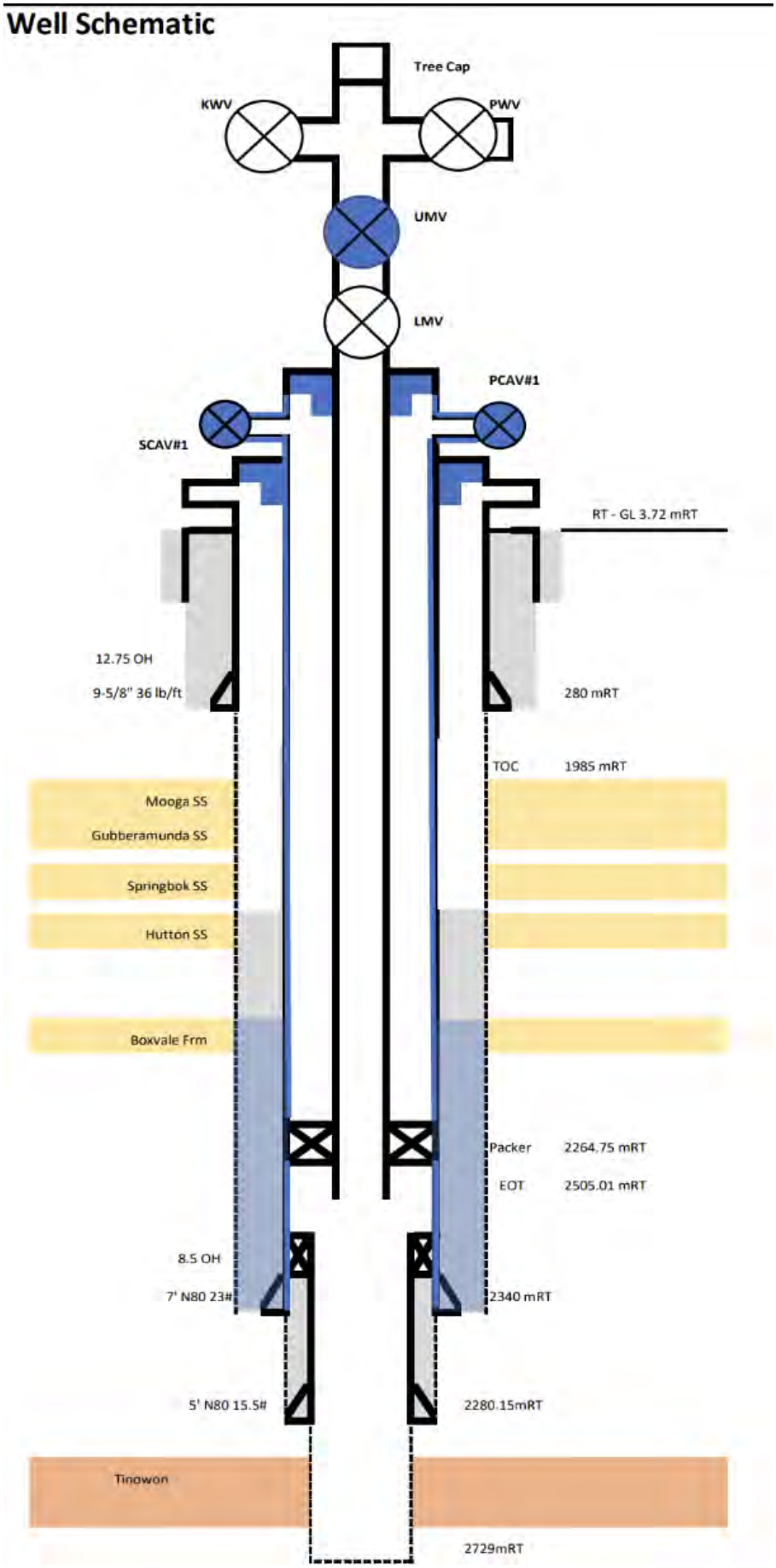

Figure 7 Typical well construction in PL1158 (PL202)

Due to the isolated and deep nature of the proposed activities, there is a very low risk of impacts to the groundwater environmental values of the potentially impacted formations. See the Groundwater Environmental Values for the Maranoa-Balonne Rivers Basin detailed in the Queensland Murray-Darling and Bulloo River Basins, Groundwater Environmental Values and Water Quality Objectives, All Groundwater of the Queensland Murray-Darling and Bulloo River Basins (2020). This has been established under the Environmental Protection (Water and Wetland Biodiversity) Policy (EPP). Note, the applicable EVs and beneficial uses to be protected for the Upper Tinowan Sandstone (e.g. Earlier Basins Partially Underlying the Great Artesian Basin) are presented in Table 9.

Table 9 Summary of Environmental Values within the Target Formation

Ecosystem / Value	Description	Associated Geology	Potential Impact
Aquatic Ecosystem	A community of organisms living within or adjacent to water, and association of a nearshore area. (EPP (Water and Wetland Biodiversity), schedule 2 – dictionary). The intrinsic value of aquatic ecosystems, habitat for wildlife in waterways and riparian areas, for biomass, biodiversity, ecological interactions, plants, animals, key species (such as turtles, dugongs, seagrass and dugongs) and their habitat. Food and drinking water. Waterways include perennial and intermittent surface waters, groundwater in tidal and non-tidal waters, lakes, storages, reservoirs, dams, wetlands, swamps, marshes, lagoons, corals, mangroves, intertidal channels and the bed and banks of waterways.	Upper Tinowon Sandstone	Very low risk of a minor impact (see Section 7.1.4.1 in relation to groundwater dependent ecosystems and Appendix E).
Stock Watering	Suitability of water supply for production of healthy livestock.	Upper Tinowon Sandstone	Very low risk of a minor impact as it is not a beneficial use aquifer due to low permeability and high salinity (see Section 6.1.4 and Appendix E)
Cultural and Spiritual Values	Means scientific, social or other significance to the present generation or past or future generations, including Aboriginal people or Torres Strait Islanders. Examples include: historical, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities, aesthetic (landmarks and icons (such as waterways, turtles and frogs)), and recreational (such as agriculture and fishing).	Upper Tinowon Sandstone	Very low risk of a minor impact. There is no demonstrable connectivity from the deep strata stimulation to the Tinowon Sandstone shallow units. Therefore, cultural and spiritual values would not be adversely impacted by the Proposed Activity

Notes: Environmental values and definition in the table above have been sourced from Table 15 of the Queensland Murray-Darling and Bulloo River Basins Groundwater Values and Water Quality Objectives.

6.1.5. Groundwater Use in the Project Area

A search of the Queensland online groundwater database was undertaken for the Waggamba Field. The number of regional groundwater bores within the Waggamba Field is limited, with only seven (7) being present (Table 10). These wells and their proximity to Waggamba 1H well are presented below (Figure 8). Only 1 of these wells (RN23097) is within 2 km of Waggamba 1H well. Five of the wells are artesian (ranging between 2,335 m and 2,771 m deep) and assumed to be used for water supply (no information has been provided to indicate that they are not used). There are two (2) shallow monitoring wells shallow (all approximately 33 m deep).

Table 10 Regional groundwater bores within the Field

Name	RN23097	RN41720033	RN22669	RN22962	RN22780	RN23005	RN41720027
Type	Artesian – controlled flow	Sub-artesian monitoring	Artesian – controlled flow	Artesian – controlled flow	Artesian – controlled flow	Artesian – controlled flow	Sub-artesian monitoring
Year drilled	1981	2000	1970	1981	1971	1982	2000
Converted petroleum well?	Y	N	Y	Y	Y	Y	N
Total depth (m)	2,690	33	2,769	2,335	2,584	2,656	33
Depth to Intersecting Aquifer							
Mooga	649.9	-	651.04	-	689.99	-	-
Gubberamunda	901.3	-	894.38	-	894.19	874.45	-
Springbok	1,193.6	-	1,158.39	-	1,174.34	1,168.18	-
Hutton	1,490.5	-	1,458.79	1,453.74	1,454.64	1,471.63	-
Boxvale	1,727.7	-	1,688.04	1,711.17	1,673.53	1,691.07	-

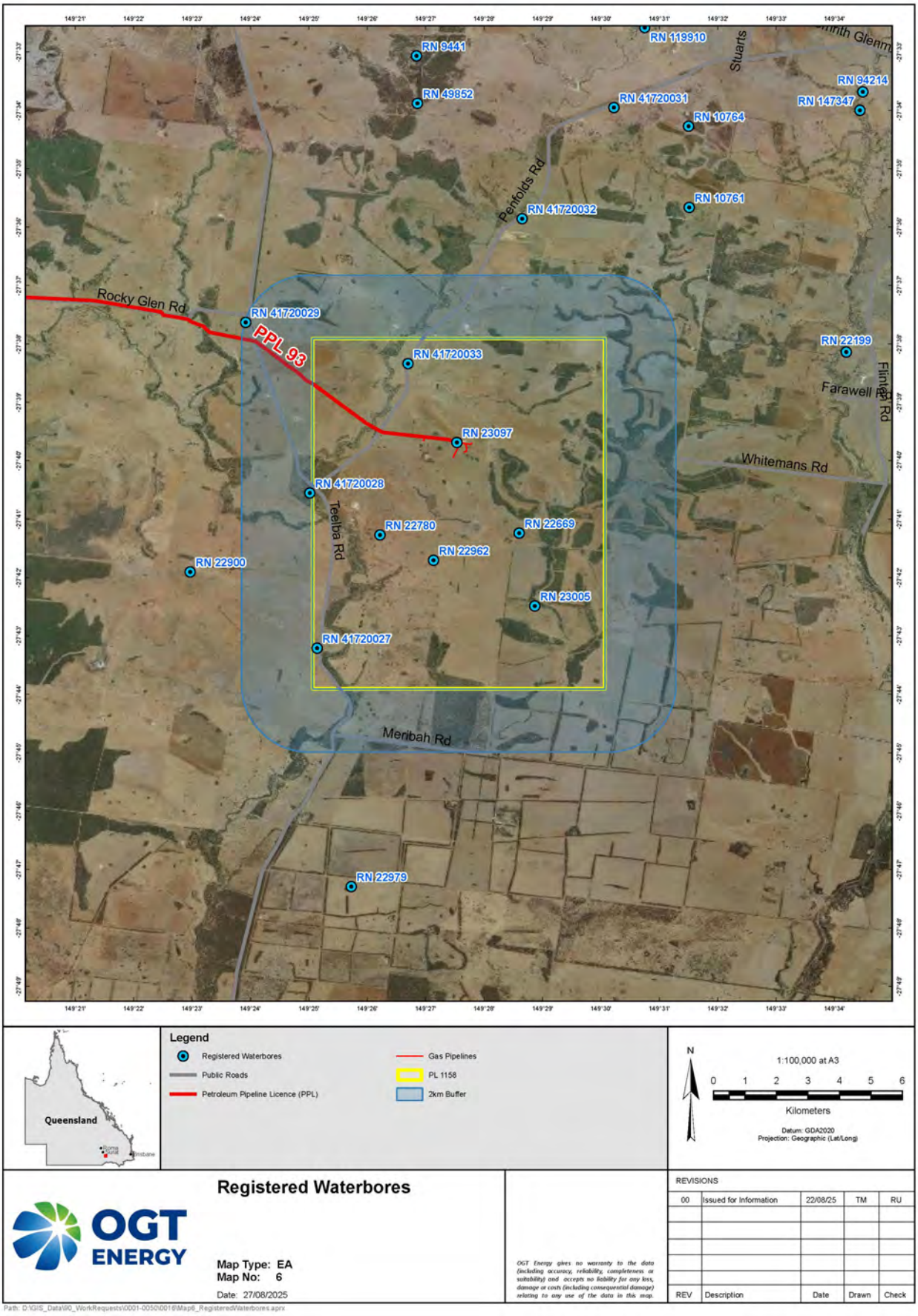

Figure 8 PL 1158 Registered water bores

6.1.5.1. Groundwater Dependant Ecosystems

Ecosystems that rely on groundwater for some or all their water requirements are classified as GDE. Not all GDE's draw on groundwater directly and not all are sole reliant on groundwater. In many cases however, groundwater commonly provides an important and reliable source of water to many ecosystems and can be the main factor controlling the distribution of ecosystem types. In many cases the groundwater provides baseflow in rivers that ecosystems depend on. The impact of changes in groundwater quality and quantity on GDEs is determined by the degree and nature of their groundwater dependency.

GDE mapping by the Queensland Government indicates that within PL 1158, there are identified unconsolidated sedimentary aquifers that are generally associated with the mapped Terrestrial derived GDE of 81-100% moderate confidence area, which generally follows the associated mapped creek/waterway. There is also approximately 50% of PL1158 (PL202) that is noted as having no identified aquifers.

Following the Teelba Creek that winds its way a general north to south direction along the Teelba Road within PL 1158. Teelba Creek drains directly into the Moonie River, part of the Murray Darling Basin. There is mapped Terrestrial derived GDE of 81-100% low confidence (according to Queensland Government QGlobe accessed on 21/8/2025). There are smaller portions of high confidence Terrestrial GDE derived areas within the PL 1158.

There are non-riverine wetlands of low conservation significance within PL1158 (PL202) that sit within the Border Rivers and Moonie Underground Water Management Area.

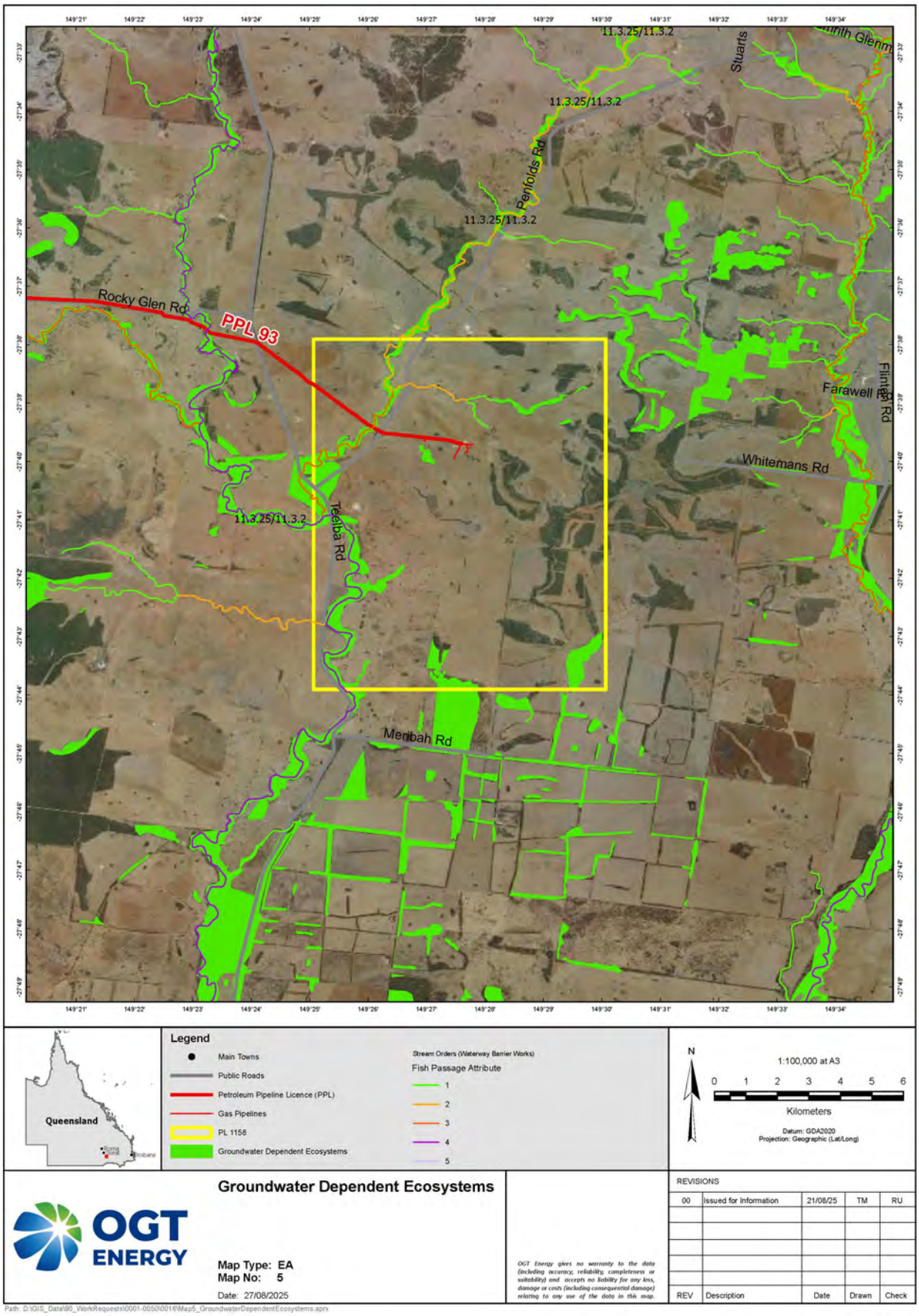

Figure 9 PL 1158 Groundwater Dependent Ecosystems

6.2. Land

Regional land use includes agriculture, oil and gas exploration and production. Currently, petroleum, oil and gas are significant contributors to the region's economy with agriculture, which was the traditional economic base for the region.

Local land use within the PL is mainly livestock grazing, limited cropping and cleared open space.

There are tracts of strategic cropping land mapped across the lease area but none within the disturbance footprint.

6.2.1. Regional Interest Areas

According to the desktop EAR for PL1158 (PL202) and field ecology survey for Waggamba 6H-7H conducted by Boobook Ecological Consulting in July 2025, there are no areas of regional interest under the Regional Planning Interest Act 2014 within PL 1158.

6.2.2. Environmental Sensitive Areas

There are ESAs relevant to PL1158 (PL202) that will need to be considered prior to undertaking the proposed activity given these are protected in the current EA conditions. Key findings from the EAR Boobook report were:

- Category A – no mapped ESA within PL1158 (PL202)
- Category B – approximately 333.7 ha of endangered regional ecosystem within PL1158 (PL202) but none were within the disturbance footprint
- Category C - approximately 591.3 ha of concern regional ecosystem within PL1158 (PL202) but none were within the disturbance footprint

6.2.3. Sensitive receptors

Two (2) sensitive receptors mapped within PL1158 (PL202) (Figure 11). Both properties located on Teelba Road and owned by the same land owner.

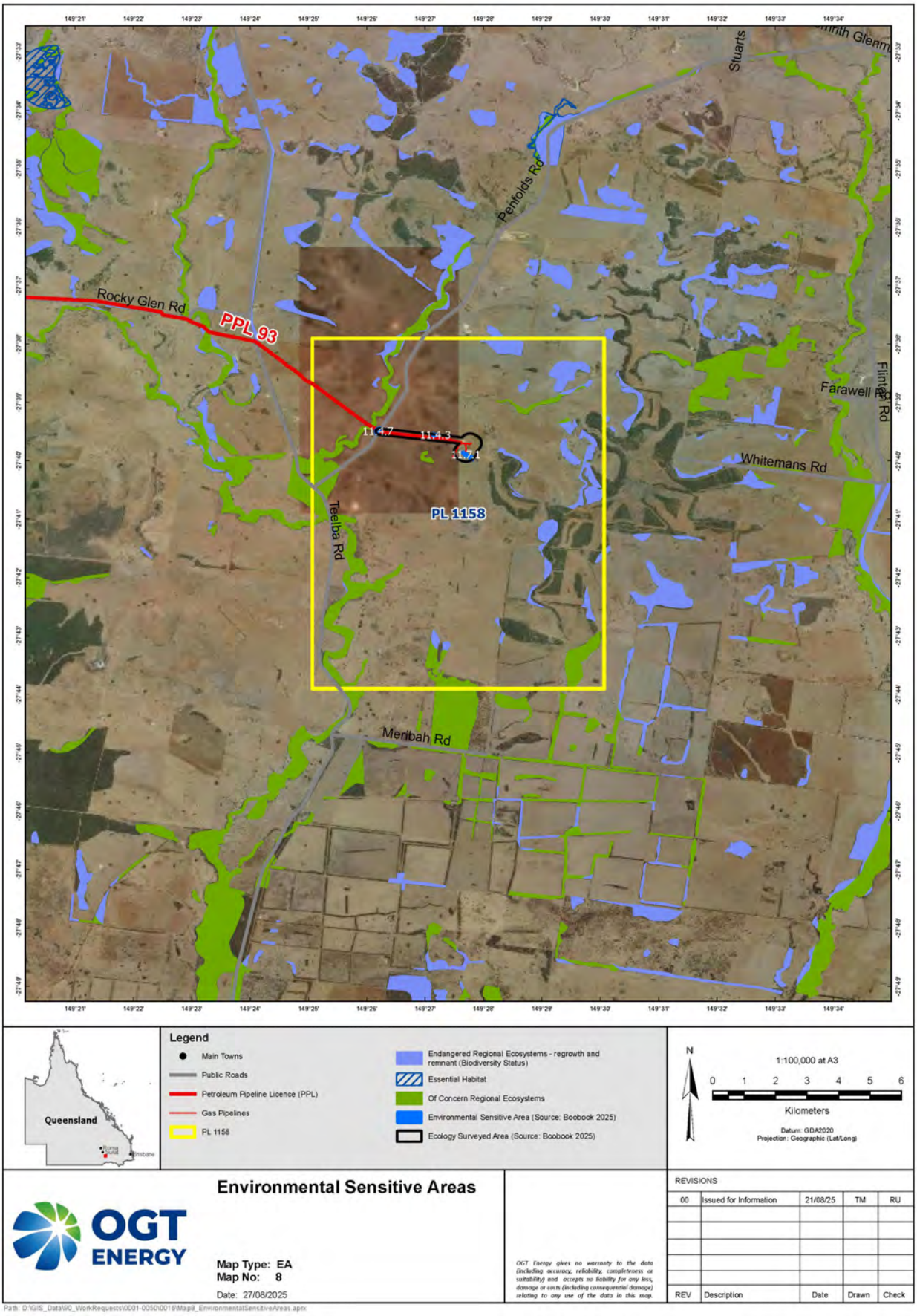

Figure 10 PL 1158 Environmentally Sensitive Areas

6.3. Biodiversity

6.3.1. Matters of national environmental significance (MNES)

6.3.1.1. Threatened Ecological Communities (TEC)

Protected Matters Search Tool (PMST) search results (DCCEEW 2025a) indicated the potential presence of four (4) TEC within the PL:

- Brigalow (Acacia harpophylla dominant and co-dominant)
- Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions
- Poplar Box Grassy Woodland on Alluvial Plains
- Weeping Myall Woodlands.

No TECs were identified within the disturbance footprint.

6.3.1.2. Threatened Flora

A likelihood of occurrence assessment indicated the potential occurrence of EPBC Act-listed threatened flora species within the buffered desktop search area. Other search results (ALA 2025, DETSI 2025a) and is presented in Table 11. No threatened flora species listed under the EPBC Act or NC Act were identified within the disturbance footprint during the field survey.

Table 11 Summary of Likelihood of Occurrence of Threatened Flora

Family	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Apocynaceae	*Vincetoxicum forsteri* (as *Tylophora linearis*) Slender Tylophora	E	E	Potentially present
Euphorbiaceae	*Bertya opponens* Coolabah Bertya, Broad-leaved Bertya	V	C	Likely to be present
Surianaceae	*Cadellia pentastylis* Ooline	V	V	Likely to be present

Legend to Status: E = Endangered; V = Vulnerable; C = Least Concern

6.3.1.3. Weeds of National Significance (WoNS)

Two species of WoNS were detected within the disturbance footprint (Table 12).

Table 12 Summary of WoNS and Biosecurity Act Invasive Plants

Family	Scientific Name	Common Name	WoNS / Biosecurity Act Status
Cactaceae	*Opuntia stricta*	Common Pest Pear	WoNS, Cat. 3 Restricted Matter
Cactaceae	*Opuntia tomentosa*	Velvety Tree Pear	WoNS, Cat. 3 Restricted Matter

6.3.1.4. Threatened Fauna

A likelihood of occurrence assessment indicated the potential occurrence of 18 EPBC Act-listed threatened fauna in the PL as per the PMST search (DCCEEW 2025a) and is presented in Table 13. No EPBC Act-listed threatened fauna species were detected within the disturbance footprint during the field survey.

Table 13 Summary of Likelihood of Occurrence of Threatened Fauna

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Birds	*Aphelocephala leucopsis*	V	V	Potentially present

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
	Southern Whiteface			
Birds	*Botaurus poiciloptilus* Australasian Bittern	E	E	Potentially present
Birds	*Calidris acuminata* Sharp-tailed Sandpiper	V	V	Potentially present
Birds	*Calyptorhynchus lathami lathami* Glossy Black-Cockatoo (Eastern/South-eastern subspecies)	V	V	Potentially present
Birds	*Climacteris picumnus victoriae* Brown Treecreeper (south-eastern)	V	V	Potentially present
Birds	*Gallinago hardwickii* Latham's Snipe, Japanese Snipe	V	V	Potentially present
Birds	*Grantiella picta* Painted Honeyeater	V	V	Potentially present
Birds	*Hirundapus caudacutus* White-throated Needletail	V	V	Likely to be present
Birds	*Lophochroa leadbeateri leadbeateri* Pink Cockatoo (eastern)	E	E	Potentially present
Birds	*Rostratula australis* Australian Painted Snipe	E	E	Potentially present
Birds	*Stagonopleura guttata* Diamond Firetail	E	E	Potentially present
Fish	*Bidyanus bidyanus* Silver Perch	E	E	Potentially present
Mammals	*Nyctophilus corbeni* Eastern Long-eared Bat	V	V	Potentially present
Mammals	*Phascolarctos cinereus* Koala	E	E	Potentially present
Reptiles	*Delma torquata* Collared Delma	V	V	Potentially present
Reptiles	*Egernia rugosa* Yakka Skink	V	V	Potentially present
Reptiles	*Furina dunmalli* Dunmall's Snake	V	V	Potentially present
Reptiles	*Hemiaspis damelii* Grey Snake	E	E	Potentially present

Legend to Status: E = Endangered; V = Vulnerable

6.3.1.5. Migratory and Marine Fauna

A likelihood of occurrence assessment indicated the potential occurrence of five (5) EPBC Act-listed migratory and marine species in the PL as per the PMST search (DCCEEW 2025a) and is presented in Table 14. No species of EPBC Act-listed migratory/marine fauna were observed within the disturbance footprint during the field survey.

Table 14 Summary of Likelihood of Occurrence of Migratory and Marine Fauna

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Birds	*Apus pacificus* Fork-tailed Swift	Mi, Ma	SL	Likely to be present
Birds	*Bubulcus ibis* (listed as *Ardea ibis*) Cattle Egret	Ma	C	Potentially present
Birds	*Chalcites osculans* (listed as *Chrysococcyx osculans*) Black-eared Cuckoo	Ma	C	Likely to be present
Birds	*Hirundapus caudacutus* White-throated Needletail	Mi, Ma, V	V	Likely to be present
Birds	*Merops ornatus* Rainbow Bee-eater	Ma	C	Likely to be present

Legend to Status: Mi = Migratory; Ma = Marine; CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; SL = Special Least Concern; C = Least Concern

6.3.1.6. Internationally and Nationally Important Wetlands

No internationally or nationally significant wetlands are present within or near the disturbance footprint.

6.3.2. Matters of State Environmental Significance (MSES)

6.3.2.1. State Conservation Areas

There are no State conservation areas including national parks, state forests, resource reserves, other estates, nature refuges, special wildlife reserves, State marine parks (highly protected zones) or Fish Habitat Areas within the disturbance footprint.

6.3.2.2. Regulated Vegetation

State regulated vegetation (DNRMMRRD 2025c) mapped within the PL is summarised within Table 15 and shown in Figure 11. There is no State regulated vegetation (DNRMMRRD 2025c) mapped within the disturbance footprint.

Table 15 Summary of Regulated Vegetation

VM Act Category	Description	Area (ha)
B	Remnant vegetation	1,300.2
C	High-value regrowth vegetation	81.2
X	Exempt clearing work on freehold, Indigenous and leasehold land	7,728.3

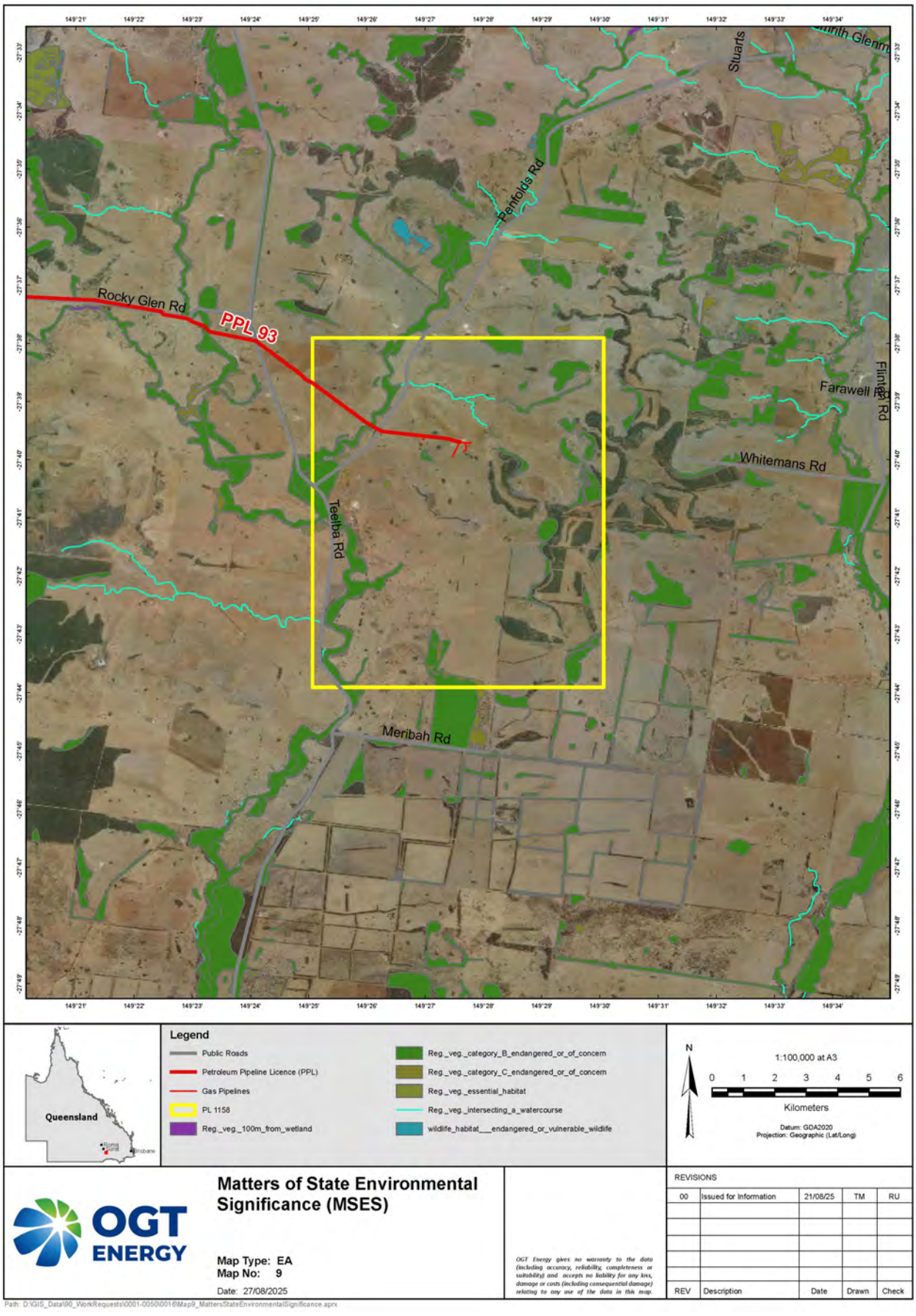

Figure 11 Matters of State Significance (MSES)

6.3.2.3. Vegetation Management (VM) Act Watercourse Vegetation

VM Act watercourses are present within the PL. Table 16 summarises the extent of regulated vegetation within a watercourse buffer and regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse or relevant drainage feature. There are no VM Act watercourses are present within the disturbance footprint.

Table 16 Summary of Regulated Vegetation

RE	RE Short Description (Qld Herbarium 2024)	Extent of RE (ha)
11.3.25 / 11.3.2	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines / *Eucalyptus populnea* woodland on alluvial plains	131.0
11.4.3 / 11.4.7	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains / *Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains	0.7
11.4.7 / 11.4.12	*Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains / *Eucalyptus populnea* woodland on Cainozoic clay plains	4.1
11.5.5	*Eucalyptus melanophloia*, *Callitris glaucophylla* woodland on Cainozoic sand plains and/or remnant surfaces. Deep red sands	3.8
11.5.13	*Eucalyptus populnea* +/- *Acacia aneura* +/- *E. melanophloia* woodland on Cainozoic sand plains and/or remnant surfaces	6.6
	Total	**146.2**

6.3.2.4. Regional Ecosystems

State government mapped remnant RE (biodiversity status) (DETSI 2025h) and mature regrowth (DETSI 2025i) is shown in detail in the Ecological Assessment Report for PL1158 (PL202) and field ecology survey for Waggamba 6H-7H conducted by Boobook Ecological Consulting (EAR Boobook) in July 2025. None of the vegetation within the disturbance footprint is mapped by the state government as remnant or high-value regrowth.

Ground-truthed RE types within the disturbance footprint are listed in Table 17.

Table 17 Summary of Remnant RE

RE Code	VM Act Class	Biodiversity Status	Short Description (Queensland Herbarium 2024)
11.4.3	E	E	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains
11.4.7	E	E	*Eucalyptus populnea* with *Acacia harpophylla* and/or Casuarina cristata open forest to woodland on Cainozoic clay plains
11.7.1	LC	OC	*Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust

Legend to Class and Status: E = Endangered; OC = Of Concern; LC = Least Concern; NCAP = No Concern at Present

6.3.2.5. Threatened Flora

One species of flora scheduled as Vulnerable under the NC Act was identified within the buffered desktop search area this being Ooline (*Cadellia pentastylis*) (DETSI 2025a, ALA 2025). No NC Act-listed threatened flora species were detected within the disturbance footprint during the during the field survey.

No VM Act Essential Habitat is mapped within the disturbance footprint.

There are no High-Risk Areas as shown on a Protected Plants Flora Survey Trigger Map (DETSI 2025c) within the PL.

6.3.2.6. Special Least Concern (SLC) Flora

One species of flora scheduled as SLC, Kurrajong (*Brachychiton populneus* subsp. trilobus), under the Nature Conservation Act (NC Act) was detected within the disturbance footprint.

6.3.2.7. Biosecurity Act and Other Weeds of Management Concern

Two species of weeds (invasive plants) scheduled as Category 3 restricted matter under the Biosecurity Act were detected within the disturbance footprint:

- Velvety Tree Pear
- Common Pest Pear.

6.3.2.8. Threatened Fauna and Essential Habitat

Desktop searches of public databases (DETSI 2025a, ALA 2025) produced records of three NC Act-listed threatened species within the buffered desktop search area these being: Koala (*Phascolarctos cinereus*), Woma (*Aspidites ramsayi*) and Silver Perch (*Bidyanus bidyanus*). The Woma is listed as threatened under the NC Act only is expected to occur within the tenement. A likelihood of occurrence assessment for the Woma is shown in Table 18.

There was no NC Act-listed threatened species found during the field survey.

Table 18 Summary of Likelihood of Occurrence of Threatened Fauna

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Reptiles	*Aspidites ramsayi* Woma	-	NT	Likely to be present

Legend to Class and Status: NT = Near Threatened

There is no mapped Essential Habitat for threatened fauna within the PL.

6.3.2.9. Koala Habitat and Priority Areas

The parts of Queensland where koalas are known to occur has been divided into three koala districts - Koala District A, Koala District B and Koala District C. Each Koala district is made up of areas with comparable Koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes. PL1158 (PL202) is located within Koala District C and not classified as a Koala Priority Area.

6.3.2.10. Special Least Concern (SLC) Fauna

One species of non-migratory SLC fauna scheduled under the NC Act was identified within searches of WildNet (DETSI 2025a) and ALA (2025) databases this being Short-beaked Echidna (*Tachyglossus aculeatus*). A likelihood of occurrence assessment is included within Table 19.

No SLC fauna species were detected during the field survey, but it is likely that Short-beaked Echidna (*Tachyglossus aculeatus*) occurs within the disturbance footprint.

Table 19 Summary of Likelihood of Occurrence of SLC Fauna

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Mammals	*Tachyglossus aculeatus* Short-beaked Echidna	-	SLC	Likely to be present

Legend to Class and Status: SLC = Special Least Concern

6.4. Air Quality

6.4.1. Environmental Values

The EVs of the air environment to be enhanced or protected are listed in the EPP (Air) 2019 as:

- The qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems
- The qualities of the air environment that are conducive to human health and wellbeing
- The qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property
- The qualities of the air environment that are conducive to protecting agricultural use of the environment.

6.4.2. Sensitive Receptors

There are 2 sensitive receptors, both located to the western side of PL1158 (PL202), on Teelba Road. Refer to Figure 12 for the location of these sensitive receptors.

6.4.3. Existing Air Quality

No known ambient air quality assessments have been undertaken at PL1158 (PL202), but the area is representative of a rural environment. Ambient air and odours are likely to be representative of a farming community, with emissions from farming equipment and farm animals and their by-products (e.g. manure etc.).

The PL1158 (PL202) has existing air quality condition in Schedule B - Air:

> *The release of any dust, particulate, aerosol or odour resulting from the activity must not cause an environmental nuisance at any sensitive place.*

Air quality impacts from the proposed activities have the potential to adversely affect public amenity without adequate control strategies.

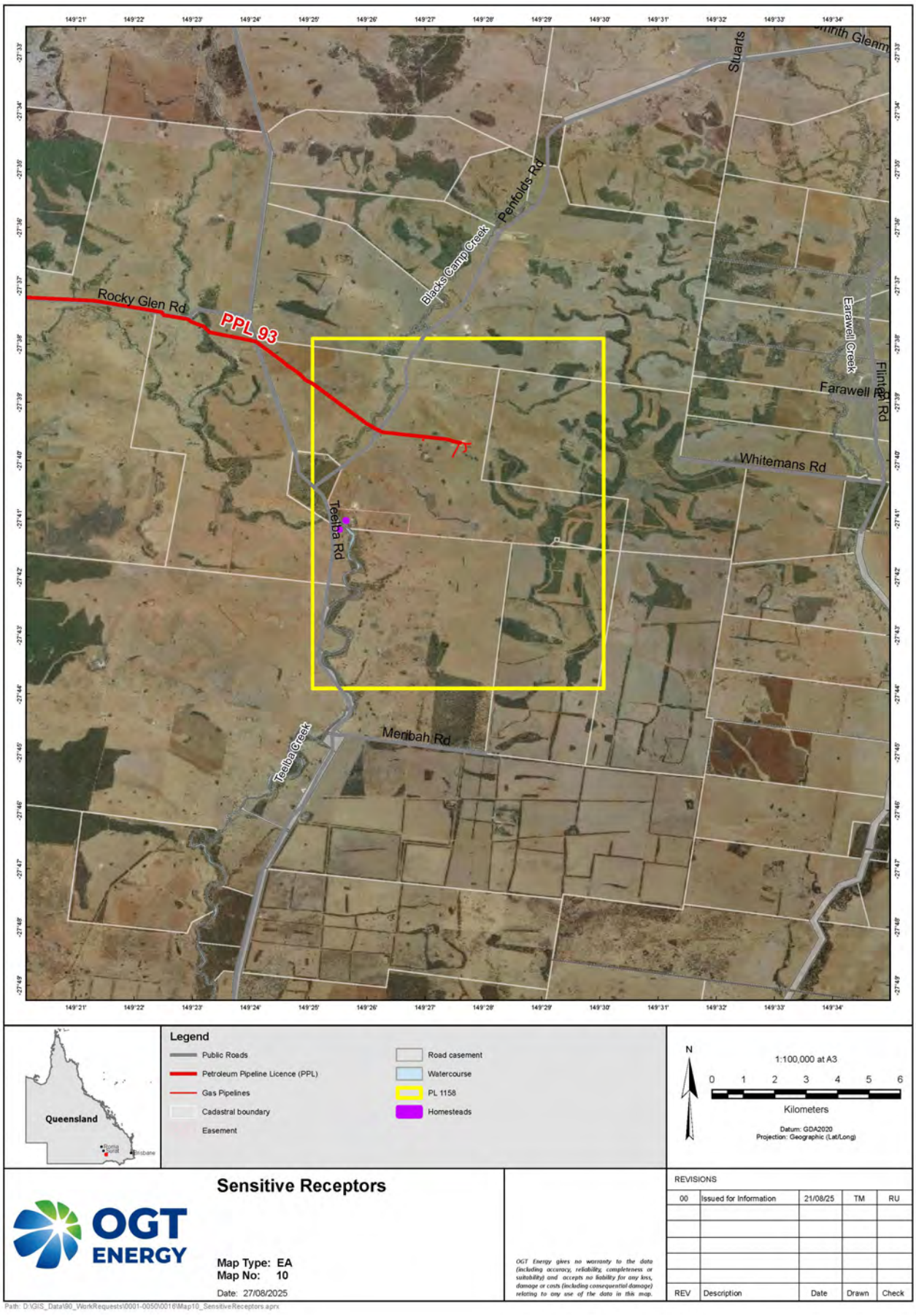

Figure 12 Sensitive Receptors

6.5. Noise

6.5.1. Environmental Values

The EVs to be enhanced or protected under the EPP (Noise) 2019 are—

- Protecting the health and biodiversity of ecosystems; and
- Human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following –
  - Sleep
  - Study or learn
  - Be involved in recreation, including relaxation and conversation.
- The qualities of the acoustic environment that are conducive to protecting the amenity of the community.

6.5.2. Sensitive Receptors

There are 2 sensitive receptors, both located to the western side of PL1158 (PL202), on Teelba Road. Refer to Figure 12 for the location of these sensitive receptors.

6.5.3. Existing Noise Environment

PL1158 (PL202) noise profile is representative of a rural environment. Ambient and audible noises included those originating from farming equipment and fauna (including domestic farm animals, birds and insects).

The PL1158 (PL202) has existing noise conditions which are presented in the

Figure 13 of table G below, from Schedule G – Noise of P-EA-100227919. These conditions require in advance of short-, medium- or long-term noise events an assessment of noise impacts on sensitive receptors to ensure that they do not exceed the limits in Schedule G Table 1.

Schedule G: Table 1 — Noise Limits at Sensitive Receptors

Time Period	Metric	Short Term Noise Event	Medium Term Noise Event	Long Term Noise Event
7:00am - 6:00pm	$L_{Aeq,\ adj,\ 15min}$ Max $L_{pA,\ 15mins}$	L_{ABG} + 10 dBA 55 dBA	L_{ABG} + 8 dBA 51 dBA	L_{ABG} + 5 dBA 45 dBA
6:00pm - 10:00pm	$L_{Aeq,\ adj,\ 15min}$ Max $L_{pA,\ 15mins}$	L_{ABG} + 10 dBA 50 dBA	L_{ABG} + 8 dBA 46 dBA	L_{ABG} + 5 dBA 40 dBA
10:00pm - 6:00am	$L_{Aeq,\ adj,\ 15min}$ Max $L_{pA,\ 15mins}$	L_{ABG} + 3 dBA 38 dBA	L_{ABG} + 3 dBA 36 dBA	L_{ABG} + 3 dBA 33 dBA
6:00am - 7:00am	$L_{Aeq,\ adj,\ 15min}$ Max $L_{pA,\ 15mins}$	L_{ABG} + 10 dBA 50 dBA	L_{ABG} + 8 dBA 46 dBA	L_{ABG} + 5 dBA 40 dBA

L_{Aeq} and Max L_{pA} are to be measured over any 15 minute period.

L_{ABG} is the deemed background noise levels which for the purposes of *Schedule G: Table 1— Noise Limits at Sensitive Receptors* are:

7:00 am - 6:00 pm: 35 dBA
6:00 pm - 10:00 pm: 30 dBA
10:00 pm - 6:00 am: 25 dBA
6:00 am - 7:00 am: 30 dBA

Figure 13 P-EA-100227919 noise conditions

Noise from HFS operations is recognised as a potential impact, with key sources including high-pressure pumps, diesel engines, and support equipment. OGT requires the HFS contractor to implement controls to minimise nuisance noise emissions.

A full noise monitoring and modelling program was deemed unnecessary based on the above noise limits in Figure 14, the distance to sensitive receptors shown in Figure 13 and the wells are on the sensitive receptors property where a conduct and compensation agreement is in place.

A desktop assessment has been conducted to assess the impacts to sensitive receptors. The closest receptor to the Waggamba 6 and Waggamba 7 wells is 4290 m. To assist in the assessment OGT has referred to publicly available report assessing noise in relation to drilling and completion (including fracture stimulation) that was completed by SLR on behalf of Santos GLNG Project (Santos (GLNG Project) *Noise and Vibration Assessment:*Gas Field Development Project SLR report number – 620.10745-R2, August 2014).

The SLR assessment completed monitoring and modelling of the GLNG tenure, which is adjacent to the OGT tenure. This report developed predicted noise levels at various distances for drilling and completion activities. The outcome of the modelling of the predicted noise levels at various distances is provided Table 20. Table 20 highlights that drilling and completion activities including fracture stimulation at 2000m in adverse weather conditions will be 33 dBA L_{Aeq}, which will meet the OGT conditions at any time period.

In relation to Waggamba wells 6 and 7 the distance between the petroleum activity and the sensitive receptors is 4290 m, which we can extrapolate from the SLR work that the dBA L_{Aeq} will be >33 and <16in adverse conditions. This confirms the proposed activities will be in compliance with the EA conditions.

Table 20 Predicted noise levels at distance for drilling and completion activities (SLR report number – 620.10745-R2, August 2014)

Construction Scenario	Weather conditions	Predicted noise level with distance (dBA L_{Aeq})[1]						
		50 m	100 m	250 m	500 m	1,000 m	2,000 m	5,000 m
Drilling and completions[2]	Neutral	77 (85)	71 (78)	59 (67)	49 (57)	38 (47)	28 (36)	<15 (19)
Drilling and completions[2]	Adverse	79 (86)	73 (80)	64 (72)	55 (63)	44 (53)	33 (42)	16 (25)

Note1 – the noise levels are predicted based on the expected summation of noise sources at the sensitive receptor for the noisiest construction stage.

Note 2 - values in brackets includes operation of a blooie line

During HFS operations, the contractor is responsible for conducting on-site verification monitoring to ensure real-time noise levels remain within modelled and permitted limits. Where monitoring identifies exceedances or community complaints, the contractor must adapt mitigation strategies and notify the site Environmental Manager. Records of monitoring results, and mitigation implementation must be maintained and made available when requested.

6.6. Waste

Table 21 lists the anticipated wastes associated with the HFS program and low hazard dam construction.

Table 21 Anticipated Waste Types

Activity	Waste Type	Disposal Option
HFS	Fracture fluid residue	Removed offsite for disposal by licensed contractors
	Flowback water	
	Contaminated equipment wash water	
Low hazard dam construction	Excavated soil	Stockpiled onsite
	Cleared vegetation	Mulched and managed on site
	Oils, lubricants, fuels and chemical containers	Removed offsite for disposal by licensed contractors
	Packaging pallets, cardboard, and other recyclable materials	
	Domestic and general solid waste from site personnel	

6.7. GHG Emissions

6.7.1. Environmental Values

The most significant GHGs, that relate to proposed activities, include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O). At a national level, Australia has been recording and reporting GHG emissions to work towards its Commonwealth reduction obligations, through the National Greenhouse and Energy Reporting (NGER). To support this, Queensland Government has recently released, *Greenhouse Gas Emissions EP Act 1994 Guidelines (June 2025)*, (Guidelines). The Guidelines define the following environmental values (EVs) that human-induced changes to climate can negatively affect:

- Human health and wellbeing
- The health and biodiversity of ecosystems
- Agricultural use of the environment.

6.7.2. Changes to GHG Requirement in EA Application

Queensland Government has recently released, the Guidelines. The Guidelines provide updated details about the GHG emissions information that would form part of an application for new or amended activities, along with any other emissions or releases likely to be generated by each relevant activity. It notes that all applications should:

- Include an emissions inventory identifying the GHG to be emitted and the stage of the project at which the emissions will occur (including the relevant sources).
- Estimate the projected annual Scope 1 and Scope 2 CO2-e emissions over the life of the project (both unabated after all avoidance and abatement measures).
- Provide an estimate of annual Scope 3 emissions and total Scope 3 emissions over the life of the project.

Note: quantification of emissions should be undertaken by an appropriately qualified person and consider the operation of the activity for the life of the project and its phases. For “petroleum and gas activities”, which are considered to be “medium to high emitter” (in the Guidelines, Table 3) the following are required in the application:

- GHG emissions inventory (Scope 1, 2 and 3)
- GHG emission mitigation and management practices (including Scope 3 where possible)
- GHG abatement plan
- A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland’s environmental values.

6.7.3. GHG Emissions Assessment

A GHG Emissions Assessment was conducted by ViridAU to evaluate the emissions associated with the project activities. A summary of the findings is provided in the section below, the full report is attached as Appendix D . Project related emission sources include:

- Fuel combustion - Emissions associated with diesel fuel combustion during:
  - Initial construction and drilling activities in the first year, including well completion (this includes fuel consumed for constructing the low hazard dam),
  - Well workovers which are assumed to occur once every five (5) years per well for the life of the well,
  - Diesel fuel consumption in stationary equipment and transport fleet for day-to-day operations across life of the project; and,
  - Diesel consumed during the plug and abandonment (P&A) phase of the well.
- Flaring emissions associated with:
  - Excess or off-spec gas flared during initial construction and drilling activities in first year; and,
  - Excess or off-spec gas flared during plug and abandonment (P&A) phase of the well.
- Venting emissions associated with:
  - Well completion with hydraulic fracturing; and
  - Well workovers with hydraulic fracturing.

No electricity is expected to be consumed as part of project's activities and therefore, estimation of scope 2 emissions have been excluded from the assessment.

Direct (Scope 1) emissions have been determined as per Section 3.1 of the GHG guideline assuming a 30-year project life for each well commencing in 2026.

Methods in the NGER Determination used to estimate fugitive GHG emissions from the above activities are listed below:

- Liquid fuel combustion – Division 2.3.2 of the NGER Determination
- Flaring – Subdivision 3.3.2.2 of the NGER Determination
- Venting associated with well completion – Subdivision 3.3.2.3.1 of the NGER Determination
- Venting associated with well workover – Subdivision 3.3.9A.8 of NGER Determination.

Specific information useful for determination of scope 1 GHG emissions, such as energy content, densities, and gas composition are presented in Table 22.

Fuel combustion emission factors as referred from the NGER Determination for the fuels that are used on site is presented in Table 23.

Due to absence of site-specific information, the following assumptions have been made to estimate GHG emissions from the project's activities:

- Operational life of the project is approximately 30 years commencing 2026
- Diesel fuel requirements during the drilling and completion phase as well as the P&A phase of each well proposed at PL1158 (PL202) have been referenced from other natural gas production and processing facilities situated in the Bowen Basin region
- Similarly fuel consumption requirements for the day-to-day operations have been referenced from similar facilities
- Average diesel usage during initial construction and drilling activities for the two (2) wells (combined fuel usage in stationary equipments and transport fleet) is estimated to be approximately 40 kilolitre/year (kL/year)
- Average diesel usage in stationary equipments and transport fleet for day-to-day operations at the two (2) wells is estimated to be approximately 5 kL/year

- Average diesel usage for well-workover activity at the two (2) wells expected to occur once every 5 years (combined fuel usage stationary equipments and transport fleet) is 17 kL/year
- Average diesel usage for the P&A phase (combined fuel usage for both stationary and transport purpose) typically at the end of project's life is 17 kL/year
- Diesel usage has been apportioned as 80% for stationary equipment and 20% for mobile fleet
- Well workover to occur once every five (5) years per well
- Average volume of gas flared across the two (2) wells during initial construction and drilling and P&A phases is estimated to be approximately 5,450 m^3/year. As noted earlier, this information has been sourced from similar gas production and processing facilities.

Table 22 Energy Content, Density and Gas Composition For Gas Extracted From Ground And Sale Gas

Parameter	Value	Unit	Reference
Energy content in 1m^3 of gas extracted from ground	39.30	MJ/m^3	Information sourced from OGT Energy's Surat Assets (SSG, CGF, WLPG)
Density of gas extracted from ground	0.74	kg/m^3	
Percentage of methane in gas extracted from ground	80.16	%	
Percentage of carbon dioxide in gas extracted from ground	0.24	%	

Table 23 Emissions Factors Used for Estimating Scope 1 Emissions from Fuel Combustion

Category	Energy Content Factor (GJ/kL)	Emission Factor (kg CO_2-e/GJ)		
		CH_4	CO_2	N_2O
Diesel oil – stationary energy purpose	38.6	0.1	69.9	0.2
Diesel oil – transport energy purpose	38.6	0.1	69.9	0.4

Estimated annual Scope 1 GHG emissions over the life of the project are summarised in Table 32 and, expressed in t CO_2-e/year for clarity. As noted earlier, the project does not require any electricity consumption, and therefore there are no scope 2 emissions.

From the information presented in Table 24, the following observations can be made:

- Venting is the largest contributor of overall Scope 1 emissions, accounting for 95.0% of the total,
- Annual direct scope 1 GHG emissions across the life of the project range from 13.5 t CO_2-e/year to 2,114.9 t CO_2-e/year, averaging at 475.7 t CO_2-e/year,
- According to the Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2025, national GHG emissions for the year to March 2025 are estimated to be 440.2 Mt CO_2-e/year. The project's average contribution to the overall national GHG emissions is approximately 0.0001%,
- According to the International Energy Agency (IEA), global CO_2 emissions were estimated to be 37.8 giga tonnes (Gt) in 2024. The project's average contributions to the global CO_2 emissions are very minimal and insignificant, equating to 0.000001% of the global emissions,
- Given that the proposed amendment involves only limited activities, the associated GHG emissions are expected to be minimal. Consequently, the overall GHG emissions from the two (2) new wells to be developed on PL1158 (PL202) are considered negligible.

Table 24 Summary of Scope 1 Emissions for the Life of the Project

Year	Diesel Fuel Combustion (t CO2-e/yr)	Flaring (Gas Exploration and P&A) (t CO2-e/yr)	Venting (Well Completion) (t CO2-e/yr)	Venting (Well Workover) (t CO2-e/yr)	Total Scope 1 Emissions (t CO2-e/yr)
2026	112.5	15.2	1,987.2	-	2,114.9
2027	13.5	-		-	13.5
2028	13.5	-		-	13.5
2029	13.5	-		-	13.5
2030	13.5	-		-	13.5
2031	44.7	-		2,004.1	2,048.8
2032	13.5	-		-	13.5
2033	13.5	-		-	13.5
2034	13.5	-		-	13.5
2035	13.5	-		-	13.5
2036	44.7	-		2,004.1	2,048.8
2037	13.5	-		-	13.5
2038	13.5	-		-	13.5
2039	13.5	-		-	13.5
2040	13.5	-		-	13.5
2041	44.7	-		2,004.1	2,048.8
2042	13.5	-		-	13.5
2043	13.5	-		-	13.5
2044	13.5	-		-	13.5
2045	13.5	-		-	13.5
2046	44.7	-		2,004.1	2,048.8
2047	13.5	-		-	13.5
2048	13.5	-		-	13.5
2049	13.5	-		-	13.5
2050	13.5	-		-	13.5
2051	44.7	-		2,004.1	2,048.8
2052	13.5	-		-	13.5
2053	13.5	-		-	13.5
2054	13.5	-		-	13.5
2055	13.5	-		-	13.5
2056	44.7	15.2		2,004.1	2,064.0
				Total ($t CO_2$-e) - life of the project	14,748.1

Although the GHG emissions associated with the project over its lifetime are expected to be very minimal and insignificant, OGT intends to implement proactive measures to reduce emissions over the life of the

project such as through the use of cleaner / lower-emission fuels, optimising operations which may result in lower fuel consumption and minimising venting of gas wherever practicable.

Consequently, the overall GHG emissions from the two (2) new wells to be developed on PL1158 (PL202) are considered negligible.

6.8. Cultural Heritage

The relevant Aboriginal Party in the Roma area is the Mandandanji People, who date back to 9,000 years ago and have a strong connection with the country. Mandandanji People were and are known as the 'fishing people' which was a reference to Mitchell's observation of a group weaving fishing nets for use in the Condamine River.

The Mandandanji People provide a cultural heritage service with the primary objective of supporting proponents undertaking works in the Mandandanji Claim area, to meet their obligations under the Aboriginal Cultural Heritage Act 2003 (Qld). The Mandandanji Claim area is shown below (Figure 14) for Native Title, which would be the same area that applies to cultural heritage.

There is a current Cultural Heritage Management Plan agreed between Mosaic Oil and Mandandanji Endorsed Parties (100-15-MP-0022).

Figure 14 Mandandanji Claim area

7. Proposed Activity

OGT intends to undertake HFS on PL1158 (PL202), subject to approval. The objective of HFS is to create a conductive flow-path (fracture) between the wellbore and the reservoir and placing proppant in the fracture, increasing the effective permeability and ultimately the production potential of the targeted reservoir.

HFS activity for a conventional gas well has differing geological features and engineering techniques than the more recently common CSG wells drilled within Queensland. Conventional gas extraction is a well-founded science and has significant successful history but is noted to be a different technique to CSG extraction.

The intent is to undertake hydraulic fracture stimulation at all proposed future developed wells within PL1158 (PL202). The Target Formation within PL1158 (PL202) is the Upper Tinowon Sandstone.

OGT has had successful experience in completing hydraulic fracture stimulation activities on their other tenure within the same geological formations at PL213.

To support the hydraulic fracture stimulation, low hazard dams are required to store HFS source water and following the HFS activity contain and manage flowback water prior to disposal at a licensed facility.

The Proposed Activity and fluid composition is described in Section 7.1 and Section 7.1.3, respectively.

7.1. Hydraulic Stimulation Process for a Conventional well

During a HFS, fluid (typically over 90% water) is pumped down the wellbore (casing or tubing) into the selected target sandstone formation. The fluid is pumped at pressure high enough to initiate or induce fractures in the target formation in the direction perpendicular to the minimum stress. As pumping continues, the fracture extends from the wellbore and grows based on the rock mechanics or the mechanical earth model which is revised through core analysis and/or geophysical logs. This is then modelled using a numerical fracture stimulation model which incorporates the Mechanical Earth Model (MEM), geophysical logs, and any offset well data from previous hydraulic strata stimulations within the same field and/or reservoir.

Once the desired geometry of the fracture is initiated, proppant is added to the fluid and pumping continues until the proppant is placed into the fracture. When all the proppant is in the fracture, pumping is stopped. The pressure inside the fracture drops, allowing the fracture to close. The closing fracture occurs within minutes, trapping the proppant inside the formation, which creates a highly permeable and conductive pathway that extends laterally into the formation and connects the conductive pathways (fractures) back to the cased wellbore.

The permeable path left in the formation is the main objective of the hydraulic strata stimulation. This flow path created within the Target Formation enhances hydrocarbon production flow from the Target Formation to the wellbore with minimised resistance.

OGT has developed a Mechanical Earth Model (MEM) of the target field for PL1158 (PL202) and target well to provide certainty regarding the risk of the proposed activity prior to commencing the fracture activity. A MEM will be run for any of the wells that are intended to be subject to hydraulic strata stimulation. Some of the data used include:

- Petrophysical logs – used as input to develop rock properties model
- CMI (image log)
- Rock mechanics core test – data was available for prospective Upper Tinowon and Lower Tinowon as well as the Wallabella formation
- Closure pressure obtained from a Diagnostic Fracture Injection Test in the Upper Tinowon and Wallabella formations
- Offset well information from the nearby Churchie field (PL192) and North Waggamba 1 well

- Mud weight data – extracted from daily drill reports for Churchie 12 and North Waggamba 1 well
- Post hydraulic strata stimulation report from well Churchie 12 with simulation modelling pre and post hydraulic strata stimulation
- Post hydraulic strata stimulation report from nearby well Churchie West 1 with simulation modelling pre and post hydraulic strata stimulation
- A geomechanical modelling report.

Results from fracture modelling using several industry-recognized simulators such as GOHFER and Kinetix with the input from the 1D MEM from Churchie 12 (in PL192) suggested hydraulic fracture length for wells within PL1158 (PL202) is likely to extend up to 1638 m (GOHFER) or 500 m (Kinetix P3D) laterally from the wellbore, with vertical height growth confined from 10 to 45m by the formation rock properties and in-situ stresses.

While different assumptions used by the modelers. All models agree on the limited height growth. At the well depths for PL1158 (PL202), horizontal fracture components are not anticipated, due to the overburden weight creating high vertical stresses. The fracture is designed based on the MEM that confirms that fractures will be relatively contained to the target reservoirs, ensuring the fracture is able to grow laterally within the reservoir.

The MEM for wells located in PL1158 (PL202) are evaluated using the three principal stresses (vertical 'overburden', and maximum and minimum horizontal stresses) through changing depth and rock strata to predict hydraulic fracture azimuth and geometry (Figure 15). The MEM is then incorporated into a hydraulic fracture model (pseudo three-dimensional) to simulate various fracture designs (fluids, injection rates, etc.) to model and optimise the hydraulic strata stimulation design and economics based on job size and estimated total production from the well.

In addition, the modelling acts as a level of confirmation that the fracture execution is relatively contained to targeted zones and does not impact beneficial aquifers above and nearby. The 'stress' in coal stratigraphic units above Wallabella and Tinowon Formations is higher than that in bounding formations. Therefore, these coals will act as choke points ('stress barriers') for propagation of hydraulic fractures vertically. There are also streaks of high stress within interburden that can act as choke points, providing vertical containment of fracture.

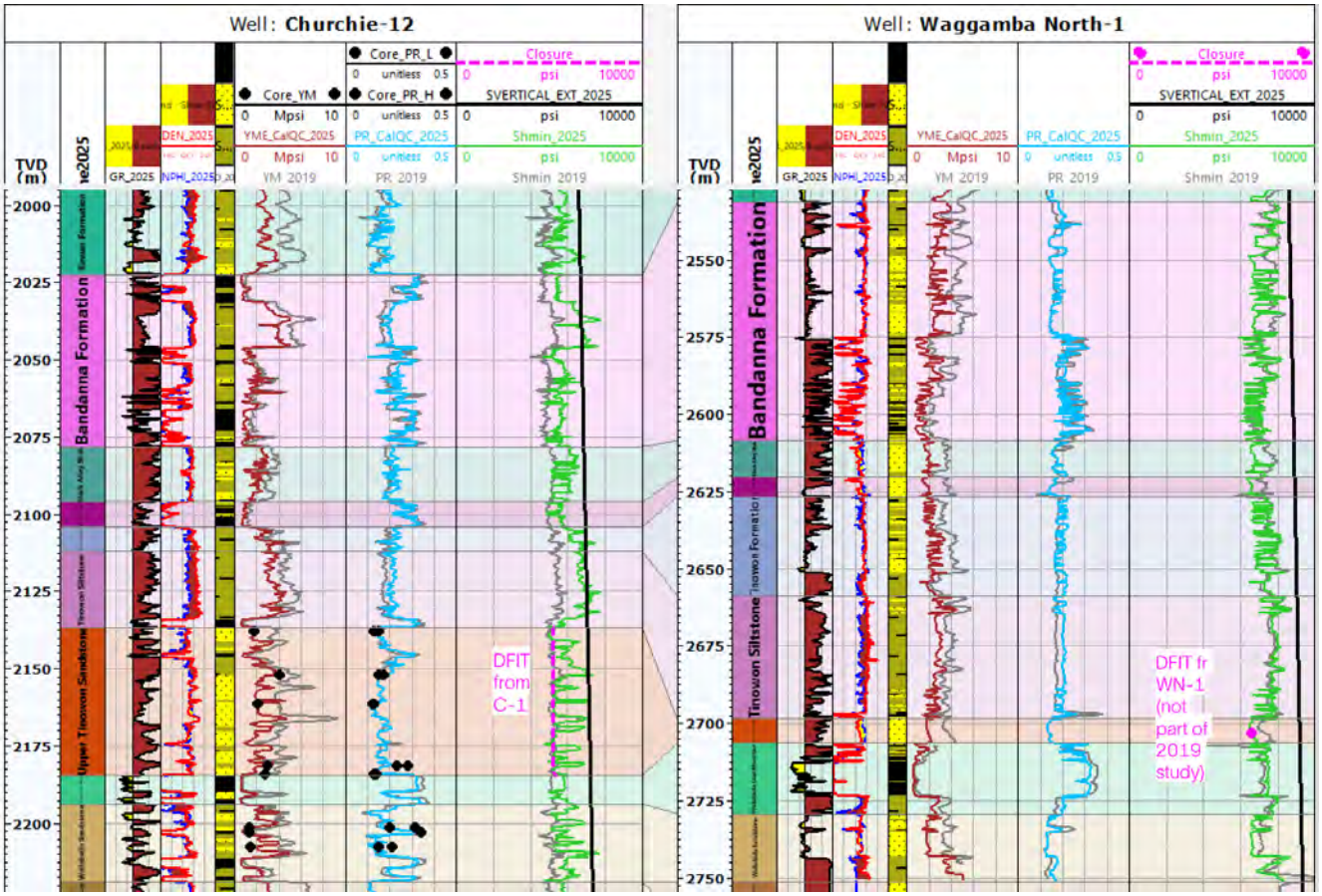

Figure 15 1D MEM Constructed for Waggamba Area – Minimum Stress

7.1.1. Predicted Lateral Fracture Extend

Two-dimensional simulation of the strata stimulation on wells within PL1158 (PL202) shows that the total horizontal fracture length may extend up to 1,600 m from the well (Figure 16).

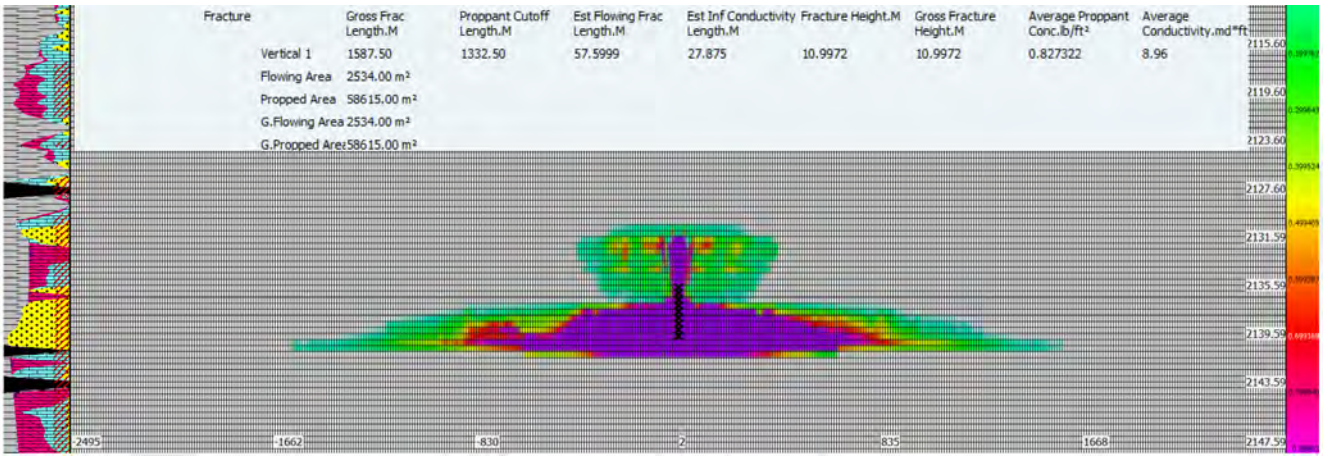

Figure 16 Upper Tinowon Fracture Modelling Example (GOHFER) Churchie-2

However, this is the simulated proppant distribution, not necessarily effective stimulation of the formation for hydrocarbon recovery. The simulation shows hydrocarbon recovery by effective stimulation may extend only up to 500 to 700 m beyond the well, with good conductivity and connection achieved only to around 300 to 400 m from the reservoir to the wellbore (Figure 16 and Figure 17).

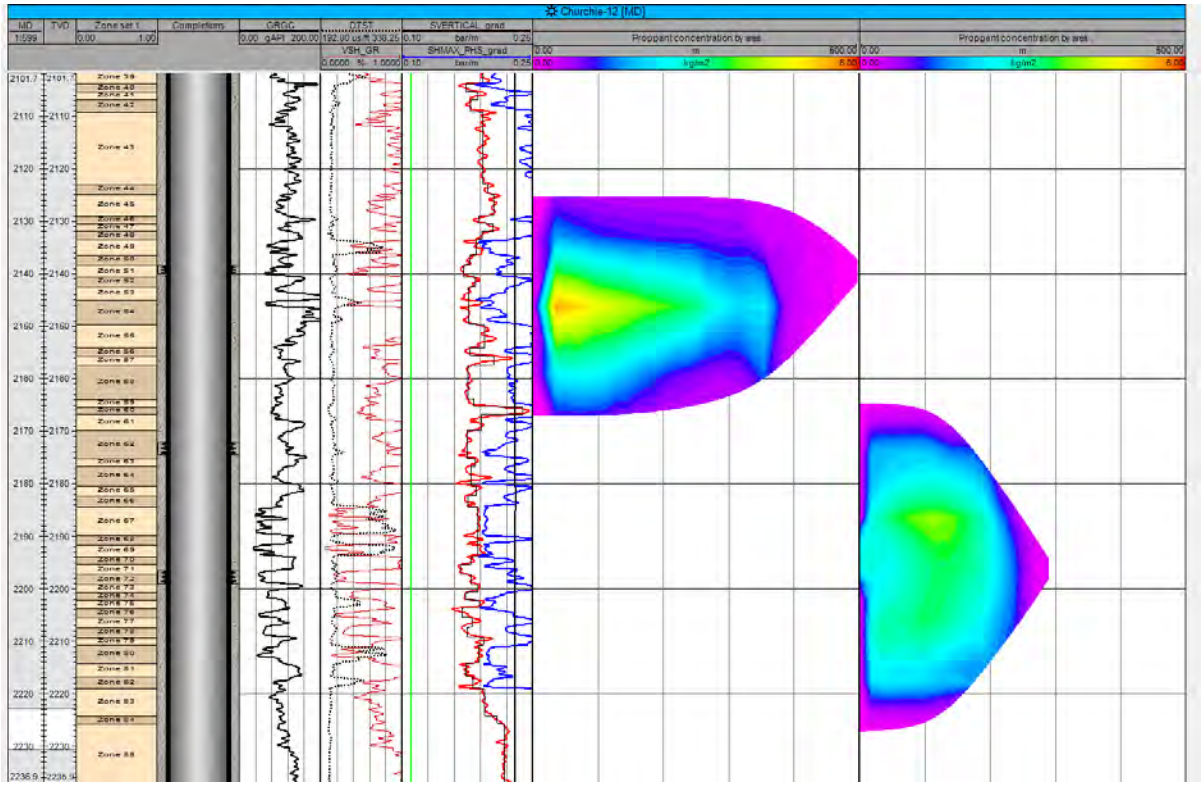

Figure 17 Upper Tinowon & Wallabella Fracture Modelling Example (Kinetix) Churchie-12

The simulated potential fracture extent is based on the MEM, which confirms that fractures will likely be relatively contained to the Target Formation and shows that the fracture is able to grow laterally within the reservoir. The HFS process is designed to contain the fractures within the target formation (Upper Tinowon Formation), since fractures outside the formation do not contribute to production.

Field data from several thousand HFS operations in numerous types of reservoirs across North America have demonstrated that sedimentary features limit vertical fracture lengths, with inefficient fracture growth across layers and interfaces. A review by Fisher & Warpinski (2012) of the aforementioned field data has shown that lateral or penetration into the reservoir fracture lengths are typically considerably shorter than 1,000 foot (approximately 300 m), with fractures usually measured in tens or hundreds of feet.

7.1.2. Predicted Vertical Fracture Extend

Due to the presence of siltstone and interbedded coal units immediately above perforated zones, very little vertical fracture growth outside the immediate Upper Tinowon Sandstone is expected (15 m thick on average across the tenure). Vertical fractures will not grow beyond the bounding Winnathoola and Tinowon Coal Members in any well within PL1158 (PL202).

The maximum height of an upward propagating fracture, assessed from microseismicity data taken from several thousand hydraulic strata stimulation operations in shale gas formations in North America, was reported as approximately 588 m by Davies et al. (2012). However, Davies et al. (2012) indicated that the probability that a stimulated fracture would extend vertically beyond 350 m was less than 1%. This is consistent with the findings of the review completed by Fisher & Warpinski (2012). In addition, the mass balance of the fracturing fluid needs to be considered. In shale gas wells, the volumes of fracturing fluid are around an order of magnitude higher than that proposed for Waggamba-6H and 7H wells.

The North American data described above include HFS of horizontal shale gas wells in the United States where the fractures are designed to propagate vertically. The vertical propagation is due to the fact that

fractures in many of the North American case studies tend to propagate parallel to the maximum stress field – of which (in the United States) is predominantly vertical due to their geology.

7.1.3. Hydraulic Fracture Stimulation Fluid Composition

For the proposed activity, the HFS fluid composition for each well will be confirmed prior to the hydraulic fracture stimulation campaign. OGT will use a tender process, to select the hydraulic fracture stimulation contractor. It is important to note that each contractor offers a unique fluid mix. In line with proposed conditions (Section 4.1), a hydraulic fracture stimulation risk assessment will be prepared for each well using the provided fluid constituents, supplied by the chosen contractor.

7.1.3.1. Persistent, Bioaccumulative and Toxic (PBT) Assessment

If the chemical is classified as persistent, bioaccumulative and toxic (i.e. meeting the criteria for all three categories), then it is considered a 'PBT chemical' (Department of the Environment and Energy, 2017). The use of such chemicals for gas extraction would likely require additional regulation and management. OGT will undertake PBT assessments completed in each hydraulic fracture stimulation risk assessment. Although it is unlikely that hydraulic fracture stimulation contractors chemicals would contain PBT chemicals, OTG will be requiring this through the selection process.

7.1.3.2. Chemical Mixtures and Compounds Formed During Stimulation

There are two main elements to the HFS fluid: the liquid and a solid proppant (sand). The majority of stimulation fluid mixture is a saline solution (of potassium chloride) with inert materials, and the remaining balance of the fluid comprises relatively low concentrations of organic chemicals, to increase the viscosity. Other than water, the stimulation fluid predominantly consists of proppants (the solid insoluble inert materials) with the next highest concentrations being inorganic chemicals that then dissociate and exist in simple ionic forms. During the stimulation process, the cross-linked fluid system becomes sufficiently viscosity carry and deliver the proppant into fractures. Once delivered, a chemical breaker is used to split gel and reduce viscosity to enable fluid flowback. Effects on stimulation fluid following breaking process can be described as follows:

- The majority of fluid's components (the proppants) will remain unchanged as they are intended to remain in-situ in stable and inert form
- Many inorganic chemicals listed in fluid will have already ionised into their component parts (e.g., potassium, hydroxide, chloride) upon mixing into stimulation fluid. Many simple ions already exist naturally in aquifers and hydrostratigraphic layers in Queensland across world are not likely to form extremely toxic organic molecules under environmentally relevant conditions. Like most reactions in environment these basic ionic components are likely to form other inorganic precipitates at extremely low concentrations solution or stay solution unreacted ionised form
- Remaining low concentrations organic molecules such as ethoxylated alcohol group chemicals will break down smaller less reactive component parts than parent compounds assessed herein.

Although the potential chemical changes from the stimulation process cannot accurately be determined in advance, the flowback fluid is expected to have a composition similar to that of the original stimulation fluid.

Table 25 describes a generic HFS fluid composition, however, the final formulation may vary according to the contractor's specifications. The HFS fluid will be assessed through a HFS risk assessment as part of the proposed HFS conditions.

Table 25 Key Components in a typical HFS fluid

Constituent Name	CAS RN	Volume (L)	Proportion of Total Volume (%)	Constituent Name
Corundum	1302-74-5	17,000	4.6	Proppant

Constituent Name	CAS RN	Volume (L)	Proportion of Total Volume (%)	Constituent Name
Mullite	1302-93-8	11,000	3.1	Proppant
Potassium chloride	7447-40-7	3,400	0.92	Clay inhibitor
Sand (crystalline silica, quartz)	14808-60-7	1,100	0.31	Proppant
Hydrochloric acid	7647-01-0	830	0.22	Reduces near wellbore tortuosity issues
Hydrotreated light petroleum distillates	64742-47-8	780	0.21	Assumed to be part of liquid guar component
Guar gum	9000-30-0	660	0.18	Liquid guar
Sodium gluconate	527-07-1	370	0.099	Delayed crosslinker
Potassium hydroxide	1310-58-3	366	0.099	Delayed crosslinker
Water in additives	7732-18-5	270	0.072	Reduces near wellbore tortuosity issues
Nonylphenol ethoxylates	9016-45-9	200	0.053	Non-ionic surfactant
Bis(hydrogenated tallow alkyl)dimethyl ammonium bentonite salts	68953-58-2	200	0.053	Assumed part of liquid guar component
Boric acid	10043-35-3	180	0.05	Delayed crosslinker
Glutaraldehyde	111-30-8	170	0.046	Biocide
Citric Acid	77-92-9	170	0.046	Lowers pH
Ethoxylated branched C13 alcohol	78330-21-9	60	0.016	Surfactant (assumed)
Ethylene glycol	107-21-1	55	0.015	Surfactant
Ammonium persulphate	7727-54-0	55	0.015	Encapsulated oxidising breaker
Sulfonic acids, C14-16-alkane hydroxy and C14-16-alkene, sodium salts	68439-57-6	53	0.014	Surfactant (assumed)
1,6-Hexanediol	629-11-8	20	0.0053	Coupling agent for bentonite clay

7.1.3.3. Aromatic Hydrocarbons in Stimulation Fluids

Each key component that goes into the stimulation fluid, including the source water, is analysed for key aromatic hydrocarbons of concern – Polycyclic aromatic hydrocarbons (PAHs) and Benzene, toluene, ethylbenzene, xylenes (BTEX).

Based on the recent hydraulic fracture stimulation in the same geological formations in PL213, the hazard related to PAH compounds is low, based on measured concentrations below the laboratories level of reporting.

7.1.3.4. Benzene, Toluene, Ethylbenzene, Xylenes

In Queensland, BTEX is strictly regulated and must not be used in stimulation fluids as it is prohibited by legislation (State of Queensland, 2010). This is interpreted to be non-detectable BTEX concentrations and are below levels of available standard laboratory LORs.

7.2. OGT previous Fracture Stimulation in the Tinwon Formation

7.2.1. Tinowon formation description across the OGT tenure

This section provides an overview of the Tinowon Formation across the OGT tenure. It also compares the Waggamaba Field and the Churchie Field, where a recent HFS has been undertaken.

The Tinowon Formation, found in the Bowen Basin of SE Queensland is a sedimentary package comprised of a sands, silts, tuff, and coals. This depositional unit is of Late Permian age and represents a time where an active margin is found to the east. This active margin is responsible for the tuffaceous component of the rock record.

The Tinowon Sands lie conformably on the Wallabella Coals and represents a period when fluvial sedimentation dominated. These sandstones vary in depositional energy levels, from the more medium energy levels (medium to fine grained sediments) in the Waggamba area to a higher energy level found in the Churchie area (coarse to fine grained). Tinowon sands fluvial systems on the western margin of the Bowen basin have a general west to east drainage orientation.

Overlying the Tinowon Sands is the Tinowon Siltstone which represents a time of marine transgression. This is evidenced by the increase in fossil fragments (calcite) as seen in core from the Dunk 1 well located in ATP 645 south east of Roma on the western flank of the Taroom Trough in the Bowen Basin where Brachiopods are plentiful. This sedimentary package offers no hydrocarbon reservoir.

Reservoirs are found in the Tinowon sands in both the Churchie area and the Waggamba area. Tinowon sand reservoirs found in the Churchie area exhibit a slightly more favourable porosity, saturations and Permeability compared to the Waggamba area. This is due to the fact that Waggamba area is found about 300m deeper than found in the Churchie area, the Waggamba area sediment package is generally smaller grained (less grain support), provenance of sediment supply differs to some extent, and possibly cementation history (alteration of tuff to clays). In all cases these reservoirs are tight and access to the hydrocarbon bearing formation is difficult.

Table 26 Tinowon reservoir information

Field	Porosities	Saturations (water)	Permeabilities	Depth (subsea)
Churchie	12-18%	30-45%	0.5- 4.0mD	-2,000m
Waggamba	10-14%	40-60%	0.05-1.0 mD	-2,300m

All though there are slight differences between the Tinowon in the Churchie Field and the Waggamba Field, the Churchie Field is a good analogue for the Waggamba Field in relation to the geology and provides a good analogy to the proposed HFS program at Waggamba 6 and 7.

7.2.2. Summary of the Churchie 2 HFS

This section summarises the HFS conducted on the Churchie 2 well (PL 192) on 7 August 2025. It provides an overview of:

- The chemical composition of fracturing fluids used
- Total fluid volumes pumped
- Flowback volumes and recovery percentage
- Pre- and post-fracture groundwater / flowback water quality
- Analytical laboratory results obtained from flowback water samples collected on 7 August 2025 and analysed by ALS.

As discussed in Section 7.2.1 the Churchie Field provides a good analogue for the Waggamba Field and the summary below is what we can expect when the HFS is completed on Waggamba 6 and 7.

7.2.2.1. Fracturing Fluid Composition

The Churchie 2 HFS used a crosslinked guar gel system with supporting additives. Chemical types and concentrations were verified in the Condor Energy Post Job Report and QA/QC logs. Additives included:

- 2% KCl brine as the base carrier fluid
- 15% HCl acid spearhead
- Guar gel concentrate (CF10GGC) at 6.25 L/m^3
- Borate crosslinker (CF380DXL) at 1.8–2.9 L/m^3
- Biocide (CFBE5) at 0.5 L/m^3
- Surfactant (CF150FBS) at 1.0 L/m^3
- Enzyme breaker (CF8200E) at 1.0 L/m^3 (diluted)
- Encapsulated AP breaker (CF8550EA) at 1–2 kg/m^3
- Live AP breaker (CF8500) at 0.8–2.0 L/m^3 (diluted).

These elements are characteristic of low-salinity, guar-based systems, which facilitate proppant transport and demonstrate efficient post-stimulation degradation.

7.2.2.2. Fracturing Fluid Volumes Pumped

According to the Condor Energy Post-Job Report:

- Total clean fluid pumped: 303,550 L
- Total slurry volume pumped: 331,580 L
- Pad volume (actual): 120,710 L

These volumes reflect the single-stage stimulation of the Upper Tinowon interval (2136.8–2140.6 m MDRT).

The pad volume refers to the initial portion of the hydraulic fracturing treatment pumped before any proppant is added, with the purpose of initiating and propagating the fracture, generating sufficient fracture width, and conditioning the formation for efficient proppant transport. For Churchie 2, the actual pad volume was 120,710 L and formed part of the total clean fluid volume of 303,550 L pumped during the treatment. Following the pad, the operation progressed into proppant laden stages, contributing to a total slurry volume of 331,580 L. These combined volumes characterise the single stage stimulation of the Upper Tinowon interval and illustrate the fluid sequencing required to establish fracture geometry and enable effective proppant placement.

7.2.2.3. Flowback Volume and Fluid Recovery Percentage

Flowback under reservoir pressure commenced shortly after stimulation. Flowback logs show that the cumulative fluid returned under reservoir pressure was 9.28 m^3. Additional fluid was recovered through coil tubing lifting operations and is estimated to be 91.12m^3.

Flowback recovery was therefore:

((9.28 m^3 + 91.12 m^3) ÷ 303.55 m^3) × 100 = 33.1%

Some additional fracture fluid may be yielded over the production life of the well however this is likely to be only small quantities. This recovery percentage is consistent with tight formations where early flowback is low due to fracture closure behaviour and fluid retention within proppant packs.

7.2.2.4. Water Quality Assessment

Baseline (Pre-Frac) Water Quality

Water for the HFS was sourced from the Churchie bore located at the OGT Churchie Facility. The baseline source water was assessed using two datasets:

- Bore water sampled on 30–31 July 2025 and sent to a NATA certified laboratory.

- On-site tank water sampled on 6–7 August 2025

To characterise the underlying source supply that feeds the on-site tank water for the HFS program, bore water samples were collected prior to mobilisation. Laboratory analysis shows:

- pH: 8.50
- Electrical conductivity: ~2,030 µS/cm
- Total dissolved solids (TDS): 1,260 mg/L
- Turbidity: 0.2 NTU
- Total hardness: 5 mg/L (very soft water)
- Alkalinity (as $CaCO_3$): ~1,040 mg/L (bicarbonate-dominated)
- Chloride: 118 mg/L
- Sodium: 499 mg/L
- Calcium: 2 mg/L
- Potassium: 2 mg/L
- Metals:
  - Iron: 0.25 mg/L
  - Boron: 4.45 mg/L
  - Copper: 0.006 mg/L
  - Manganese: 0.005 mg/L
- Hydrocarbons: All TPH, BTEX, PAHs below detection
- Dissolved gas: Methane detected at 11,600 µg/L, all other C1–C4 gases <LOR.

The Churchie bore water analysis confirms the water is slightly alkaline, contains moderate salinity (TDS ~1,260 mg/L), very low turbidity, and has no detectable petroleum hydrocarbons, indicating it is suitable for use in fracturing fluid preparation.

The on-site tank water field testing was completed immediately prior to the HFS to ensure that the water was still compatible for the HFS program. The results for the water staged on-site for HFS show:

- pH: 7.8–8.2
- Specific gravity: 1.008–1.013
- Total iron: <30 mg/L
- Sulfate: <500 mg/L
- Chlorine: 0 mg/L
- Total hardness: <500 mg/L
- Alkalinity: <500 mg/L
- Appearance: Clear, no odour

These results confirm that the water is suitable for the source water with low in dissolved solids and metals at reportable concentrations.

Post-Frac Flowback Water Chemistry

Four flowback water samples were collected at different times on 7 August 2025.

Flowback results align with expectations for a guar-based, crosslinked gel system, showing no environmental contamination beyond natural formation water and residual fracturing chemicals. Salinity, chloride, potassium, and TDS rise over time (Table 27 and Table 28), indicating increased formation water in later samples. Early hydrocarbon detection matches typical gas release in tight-gas formations like Tinowon (Table 30). Metals stay low except for boron, which stems from crosslinker chemistry (Table 29). No hazardous or unusual contaminants were found; lab results confirm normal frac-fluid/formation water interactions.

Table 27 General Water Quality Parameters

Parameter	Range Across Samples	Notes
pH	7.38 – 8.83	Slightly alkaline, typical of crosslinked gel residuals.
Electrical Conductivity	19,100 – 49,000 µS/cm	Elevated salinity consistent with frac fluid salts and formation brines.
Total Dissolved Solids (TDS)	14,500 – 27,800 mg/L	High mineral load reflecting formation water mixing.
Turbidity	33 – 3640 NTU	High values indicate suspended fines, gel residues, and proppant traces.

Table 28 Major Ions

Parameter	Range Across Samples	Notes
Chloride	7,380 – 14,100 mg/L	• Flowback water showed increasing salinity and ion concentrations relative to the base water: • High chloride and potassium levels indicate mixing of returned frac fluid (2% KCl) with formation water.
Sulfate	14 – 77 mg/L	
Sodium:	285 – 651 mg/L	
Potassium	4,830 – 15,100 mg/L	
Calcium	21 – 33 mg/L	

Table 29 Dissolved and Total Metals

Parameter	Range Across Samples	Notes
Iron	2.97 – 13.2 mg/L	• Metals were mostly low, but several increased over time • The presence of elevated boron is consistent with the borate crosslinker used during the HFS. • Metals remained below typical environmental trigger thresholds for petroleum operations.
Manganese	0.059 – 0.304 mg/L	
Boron	0.06 – 42.4 mg/L	
Zinc	<0.025 – 0.36 mg/L	

Table 30 Hydrocarbons (TPH, BTEX & Gas)

Parameter	Range Across Samples	Notes
Methane	<10 – 12,400 µg/L	• BETX only detected in the first sample • Hydrocarbon presence in early flowback is expected as formation fluids begin to return. Concentrations reduce as flowback progresses. • Hydrocarbon detection is consistent with early gas liberation and expected in tight-gas formations such as the Tinowon.
Ethane	<10 – 916 µg/L	
Propane	<10 – 451 µg/L	
Butane	<10 – 272 µg/L	
TPH C6–C10 fraction	50 – 3,830 µg/L	
Benzene	320 µg/L	
Toluene	388 µg/L	
Total xylenes	205 µg/	

7.3. Low Hazard Dam

Schedule E of P-EA-100227919 allows for the development of low hazard dams. Schedule A, Table 1 however does not include authorisation of a low hazard dam.

For OGT the proposed low hazard dams will have two purposes. The first is to hold the HFS water used for the HFS process and the second is to hold the flowback water from the HFS activities. Prior to the HFS activities a low hazard dam will be constructed in close proximity to multiple wells to enable re-use (proposed centre point is GDA2020 - Lat 149 28'30"E, Long 27 39'42"S to be confirmed with the landowner, the final location of the dam will be within the study area).

The dam will then be filled with source water and mixed with potassium chloride (this keeps clays from swelling down hole). This water is mixed with the HFS fluids and pumped down hole to complete the process.

The water qualities that will be stored in the dam are anticipated to be similar to the baseline source water water quality and the flowback water quality that is presented in section 7.2.2 for the Churchie 2 well that was recently HFS.

The dam is then used for any flowback water (which anticipated to be similar to Churchie 2 described in section 7.2.2 above). Initial flowback water may be stored in the dam to manage initial sand and fluid production. Any fluid is then stored in the dam until it can be taken offsite by a regulated waste transporter to a licenced facility. As soon as gas is seen or sand production decreases the facilities will be connected to the field gathering network and the flowback fluid along with any hydrocarbons will be transported back to the production facilities for separation and treatment. If there is no future HFS in close proximity the low hazard dam is then rehabilitated per the EA conditions.

The low hazard dam will have a footprint of 1.4 ha and the containment area is qproximately 100m x 100m x 3m, providing 30ML of storage. The dams will be constructed as “turkeys nests”, minimising their catchment (to the bank and direct rainfall) and will be located well away from any potential areas of flooding. Low permeability material (liners) will be used to minimise any seepage through the dam floor and walls. The use of liners will also protect HFS source water from contamination, which would impact the performance of the HFS. The dams will be designed, constructed, operated, and maintained to an engineering standard appropriate for its purpose and location.

As low hazard dams are not classified as "referable" under Queensland's Water Supply (Safety and Reliability) Act 2008, they do not require an Emergency Action Plan (EAP) in the same way high-hazard structures do. It is expected that conditions will focus on compliance with the Environmental Protection Act 1994 and Water Act 2000, thus requiring ensuring the structure is managed to prevent harm to the environment, timely notification to the Queensland Government of any unauthorised disturbance, potential loss of structural integrity, or significant release of contaminants.

Regular monitoring of the structure's condition and operations will be required to identify and prevent potential environmental harm. Notification of issues will be undertaken as soon as possible, but within 48 hours, of becoming aware of:

- Any unauthorized significant disturbance to land.
- Any potential or actual loss of structural or hydraulic integrity of the dam
- Any unauthorized release of significant volumes of contaminants to land or water.

8. Risks and Magnitude of Impacts on Environmental Values and Associated Management Measures

Consistent with the relevant proposed conditions (proposed to be incorporated to the existing EA), OGT commits to the following management/mitigation measures for the purposes of the proposed hydraulic fracture stimulation activities:

- Stimulation impact monitoring program
- Stimulation risk assessment
- Baseline bore and well assessment
- Groundwater quality sampling and data collection

8.1. Risk Management Process

OGT's risk management process is described in detail in the HSE Risk Management Procedure (100-15-AP-0013). It is mandatory for all statutorily prescribed matters and is also recommended for other relevant situations such as:

- When a hazard is detected or reported
- When a change is planned or occurs that affects the business activities
- After an incident or accident
- Prior to commencing work
- At regular intervals to monitor existing control measures
- Appropriate controls will be developed and implemented to reduce risk to acceptable levels and hence reduce the risk of accident or incident potential. The process will then be monitored and reviewed to confirm the effectiveness of the control measures.

The HSE risk management objectives are achieved by implementing the minimum controls detailed in the HSE Risk Management Procedure, which include:

- Risk register
- Safe system of work
- Risk assessment
- Safe work method statements
- Job safety environment analysis.

Central to this is the risk assessment process, which comprises the following steps:

- Identify hazard
- Assess the risk
- Determine controls
- Assign responsibility and timeframes
- Record the findings
- Review and Monitor.

Risk factors linked to the proposed activities are summarised in Table 31.

Table 31 Potential Risk Factors

Activity	Risk
Construction of low hazard dam	• Impacts on Flora and Fauna from construction activities • Erosion or sedimentation impacts
Operation of low hazard dam	• Soil, surface and groundwater contamination from structural or hydraulic failure • Groundwater contamination from seepage or leaks • Fauna entrapment

Activity	Risk
Use and storage of HFS chemicals	• Soil and surface water contamination from spillages
HFS	• Soil and surface water contamination from flowback water spillage • Groundwater contamination from aquifer connection

8.2. Exposure Pathways

This section assesses the exposure pathways where stimulation fluid chemicals can travel from their source to reach people, animals, or the environment nearby.

8.2.1. Surface

Under normal HFS operations:

- There is no migration pathway which can affect surface water or important wetlands downstream unless a substantial surface release event occurs
- No stimulation flowback water is planned to be released at the wellhead; it is contained in low hazard dams before being taken to a treatment facility
- In the event of an accidental release, potential exposure occurs when ecological or human receptors come into direct contact with undiluted chemicals, diluted stimulation fluids or flowback water onto soils or surface waters at the well site.

8.2.2. Sub-surface

Fluids used in stimulation (or groundwater carrying compounds from the gas layer) could only move upward into shallower aquifers if:

- New fractures from the stimulation connect upwards into an aquifer
- Natural pathways already exist between the gas layer and aquifers
- Leakage occurs around the well casing into aquifers.

This risk is considered very low because:

- Wells are designed with barriers to isolate the gas zone from aquifers
- Current wells are in good condition, with two layers of protection. All future wells will also have two layers of protection
- The geology (rock layers above and below) naturally limits upward movement
- Limited sensitive areas and land owner bores in PL1158 (PL202)
- Similar jobs in the same type of geology have shown no issues.

The target sandstone layer (Upper Tinowon) is sandwiched between:

- Low-permeability basement rock below
- A thick coal seam above, which acts like a barrier.

The likelihood of groundwater contamination is low because:

- The closest aquifer used for water supply (Boxvale Formation) is almost 500 m above the stimulation zone
- There are no known natural links exist between the sandstone and identified aquifers
- Overlying rock layers (coal, shale, and the thick Rewan formation) are very tight and absorb chemicals, adding protection
- Small fluid volumes and pumping draw fluids into the well rather than outward

- The only potential pathway for fluids to migrate to a bore or overlying aquifer would be through a direct fracture connection from the gas zone; however, modelling demonstrates this scenario is highly improbable.

8.2.3. Flowback Operations

The HFS contractor engaged by OGT will manage the entire process i.e.:

- Set up equipment like chokes, flow lines, and open-top tanks to safely capture the flowback water
- Manage the flowback and production testing
- Transportation of flowback offsite by licensed waste handlers to approved treatment facilities following strict regulations.

At the end of HFS fluid injection, a “breaker” is added to react with the gel, to reduce its viscosity. This increases the fluid’s ability to flow, allowing it to return to the surface without harming the quality of the reservoir. The pressure inside the reservoir helps push the flowback water out of the well.

Flowback water is monitored according to Queensland’s official guidelines on well construction and abandonment.

As the gas reservoir has low water content and permeability, less than 70% of the injected water is expected to be recovered, which is typical for these reservoirs.

Some slow flowback of water will continue during the production phase, but groundwater movement inside the formation is limited due to low permeability.

Environmental risks related to flowback are outlined in Table 32.

In addition to the HFS contractor’s management system, OGT maintains its own health, safety, and environmental management system i.e. guidelines for the storage, management and handling of HFS chemicals and waste.

8.2.4. Dam operations

A suitably qualified ecologist has completed a field survey to support the siting of the low hazard to minimise the impacts to ecology from the construction and operations. The report is available in Appendix B

A Registered Professional Engineer Queensland dam engineer has been commissioned to design the low hazard dam per the EA conditions in Schedule E to minimise the impacts to the environment specific to sensitive receptors, infrastructure, surface water and soil contamination from low hazard dam structural or hydraulic failure risks. The risks are considered minimal due to the application of stringent design, operational, and management controls the RPEQ must consider.

Once the HFS program is complete the dam will be rehabilitated.

Table 32 Table Risk Characterisation

Source	Pathway	Receptor	Discussion
Raw material chemicals	Spillage to ground	• Resident landholder or agricultural workers at wellhead • Terrestrial ecological and stock	Potential risks present under accident or emergency conditions only: requires management via environmental management procedures. Under normal operating conditions there should be no significant risk.
Strata stimulation fluids prior to injection	Direct contact with water prior to injection	Resident landholder or agricultural workers at wellhead	Direct contact with the injection fluid is not possible under normal operations as chemicals are added in the mixing trucks immediately prior to injection in the well. Although an accidental release is possible, it is highly unlikely. Additionally, safety risks from a failure of pressurised equipment are significant, and operating procedures exclude personnel from the vicinity during pressurised operations. There will be no access to the wellsite for the landholder and agricultural workers during the stimulation work.
	Spillage to ground	• Resident landholder or agricultural workers at wellhead • Terrestrial ecological and stock	Under normal operating conditions there is no risk. As above, accidental release is considered highly unlikely. Should a release occur, OGT's Environmental Management Plan and Emergency Response Plan require that any spillage would be contained and impacted soils remediated. All petroleum activities are undertaken at a sufficient distance from surface waters sufficiently to be potentially affected by a spillage.
Migration of HFS fluid subsurface	Migration via existing continuity within and between formation waters and adjacent aquifers	• Human health (groundwater users) • Ecological (livestock and irrigation) • Subterranean ecosystem	This pathway is not considered to be viable, and therefore no exposure is possible due to: • Well design – 2 barriers isolating the hydrocarbon zone from the surface and aquifer formations. • Proximity to sensitive receivers • The target formation is underlain by low permeable basement and overlain by a bounding coal seam. • Permeability within the target formation is low and the distance to groundwater users horizontally and vertically is at a distance that is unfeasible there would be a pathway see Appendix E . • Small fluid volumes and pumping draw fluids into the well rather than outward. • Previous experience undertaking HFS activities.
	Migration via fractures generated allowing continuity between target horizons and adjacent aquifers		
	Migration via the outside of the drilled		Proper well construction in accordance with the CoP minimises this potential pathway, and well casing failure is a rare occurrence. Failure of the well head

Source	Pathway	Receptor	Discussion
	well should the seals between horizons prove to be incomplete or weakened during strata stimulation		during strata stimulation operations would initiate an emergency stop of fluid injection. Thus, limited strata stimulation fluid is anticipated to be released in this event. Mitigation measures for well head or seal failure are within the management procedures undertaken during strata stimulation operations.
	HFS fluid remains in the target formation impacting groundwater.		Based on available information, the risk of fracture stimulation fluids affecting potential subterranean ecosystems is considered low, due to: • The negligible likelihood of subterranean ecosystem occurrence within the Upper Tinowon Sandstone. • The negligible likelihood of pathways from the Tinowon Sandstone to shallower aquifers where subterranean ecosystems could occur. • Any chemical or physical changes associated with fracture stimulation predicted to be confined to the stimulated interval and limited to a short distance from the well, meaning any groundwater changes are unlikely to reach sensitive ecological receptors. Microbial communities, while likely present in the deep formation, are not considered sensitive ecological receptors in this context. While local changes to microbial assemblages within the stimulated interval may occur as a result of fracture stimulation, these are expected to be confined to the target formation and are not anticipated to result in ecologically significant impacts beyond the immediate zone of activity. This is further discussed in Appendix E .
Flowback water at the surface	Direct contact with flowback waters	• Resident landholder or agricultural workers at wellhead • Terrestrial ecological and stock	Flowback waters will be contained at the wellsite and is disposed offsite by a licensed contractor. There is no access to the wellsite for the landholder and agricultural workforce or for stock.
	Discharge of flowback waters to surface water or ground		Potential risks present under accident or emergency conditions only. Flowback is managed via Hydraulic Fracture Stimulation Management Plan, required under the proposed conditions. Under normal operating conditions there should be no significant risk.
Structural and hydraulic failure of low hazard dam	Spillage to soil and surface water	• Terrestrial ecological and stock	Potential risks present under accident or emergency conditions only: requires management via environmental management procedures. Under normal operating conditions there should be no significant risk.

Source	Pathway	Receptor	Discussion
	Migration into shallow aquifer	• Human health (groundwater users)	The likelihood for this pathway is low as: • The dam will be designed and constructed, operated and maintained in accordance with EA conditions • A groundwater monitoring program will be implemented to detect seepage and leakage.

8.2.5. Environmental Control Measures

The HFS contractor is required to comply with OGT's Environmental Management Plan, Health and Safety Management Plan and Emergency Response Plan. These procedures provide controls on storage, management and handling of the raw material products, mixed hydraulic strata stimulation fluid and flowback. The procedures are designed to minimise impacts on the environment and to comply with legislative and regulatory requirements relevant to the project.

A site-specific SIMP will be developed to provide a framework for managing and monitoring risks associated to HFS.

An overview of the control measures, consistent with the EMP and ERP, is detailed below inTable 33:

Table 33 Summary of Environmental Control Measures

Ref#	Activity	Control Measure
1	Chemical use, storage and transport	• Plant and equipment that store hazardous chemicals/wastes (e.g. pipelines, storage tanks) are stored and handled in accordance with the relevant Australian Standard i.e.: - Fitted with appropriate engineering controls - Located and placed correctly away from sensitive receptors e.g. waterways - Operated and maintained according to manufacturer guidelines • Minimise potential land contamination in accordance with the Land Management Sub-Plan, as detailed within the EMP • Prevent the release, leakage, and spillage of hazardous chemicals, wastes, or other materials that could adversely affect surface and groundwater, in accordance with the Waste Management Sub-Plan • Prevent and manage chemical spills in accordance with the Spill Prevention and Response Management Sub-Plan within the EMP
2	Land clearing	• Undertake field verifications using a suitably qualified ecologist • At-risk areas are identified and marked before the start of construction works • Conduct progressive rehabilitation in accordance with the EA conditions • Minimise impacts to biodiversity including clearing of native vegetation and preventing the introduction and spread of weeds and pests in accordance with the EMP • Install erosion and sediment controls • Prevent impacts or harm to cultural heritage sites in accordance with the Cultural Heritage Management Plan agreed between Mosaic Oil and Mandandanji Endorsed Parties (100-15-MP-0022)
3	Air quality management	• Minimising the use of fuel by selecting fuel efficient plant and equipment, operating vehicles and machinery in a fuel-efficient manner (e.g. turning off idling equipment and selecting construction techniques that utilise lower amounts of fuel). • Implementing a maintenance plan for all fuel-powered equipment. • Implementing energy conservation practices by all staff through appropriate training. • Reducing fuel usage through adopting efficient haul routes/distances.
4	Waste management	• Wastes stored in appropriate containers and designed areas • Waste transport and disposal undertaken by licensed and approved service provider • Spill response kits are placed near potential spill areas • Conduct waste management practices in accordance with the Waste Management Sub-Plan.
5	Greenhouse gas management	• Use of equipment and machinery that has lower emissions (see Air quality above) • Manage ongoing activities to reduce natural gas losses through suitable management and maintenance controls and routine "leak detection and repair program.
6	Noise	• Compliance with the existing PL1158 (PL202) EA noise conditions • Maintenance of equipment • All equipment manufactures noise equipment (mufflers etc.) • Community engagement with sensitive receptors to discuss the works program and potential noise impacts • Alternative arrangements with landholders if necessary

Ref#	Activity	Control Measure
		• Staff Induction Program.
7	Traffic	• All vehicles and machinery will follow existing access tracks to the well pad • Limit vehicle movement to specified operating hours • Use dust suppression to limit dust generation • Control vehicle movement/access from weed infested areas • Washdown vehicles and plant/equipment moving between leases • Conduct noise monitoring following any incident or receipt of a noise complaint • Minimise the impact of noise generated by construction and operational activities in accordance with the Environmental Authority conditions
8	HFS	• Well design - 2 barriers isolating the hydrocarbon zone from the surface and aquifer formations. • Geotechnical planning including the Mechanical Earth Model to provide key technical information. • Minimise uncontrolled emissions from equipment and processes • Conduct groundwater monitoring • Contain flowback water in low hazard dams • Dispose flowback water as regulated waste • Minimise the impact of noise generated by construction and operational activities in accordance with the Environmental Authority conditions • Minimise potential land contamination in accordance with the Land Management Sub-Plan • Prevent the release, leakage, and spillage of hazardous chemicals, wastes, or other materials that could adversely affect surface and groundwater in accordance with the Surface and Groundwater Management Sub-Plan • Conduct waste management practices in accordance with the Waste Management Sub-Plan • Prevent and manage chemical spills in accordance with the Spill Prevention and Response Sub-Plan.

8.3. Risk Analysis

The assessment of the potential for sub-surface pathways to pre-exist or be created during strata stimulation is presented in Table 34.

Table 34 Summary of Risk Analysis

Aspect	Potential Consequences	Associated Activity & Mitigations (Table 33)	Residual Risk	Comments
Surface water	• Surface water contamination from migration of injected HFS fluid from the targeted fracture zone	**1, 4, 8**	**Low**	Well design – 2 barriers isolating the hydrocarbon zone from the surface and aquifer formations.
	• Surface water contamination through loss of containment	**1, 8**	**Low**	• Wells will have a 200m separation distance from water courses. • Low hazard dams will be constructed to minimise any loss of containment.
Wetlands	• Deterioration of wetland water quality from surface run-offs or through loss of containment	**1, 8**	**Low**	A GES classified wetland is located over 4km to the west of the disturbance footprint and proposed activity. No impacts to wetlands will occur.
Groundwater	• Potential risk to existing bores within and 2 km around the PL1158 (PL202) tenure	**8**	**Low**	Impacts on groundwater and existing bores are not considered to be a risk, due to: • The target formation is not considered a beneficial aquifer and is not viable to suppl water now or in the future. • Well design – 2 barriers isolating the hydrocarbon zone from the surface and aquifer formations. • The top of the cement extends above the upper most aquifer, providing isolation between the aquifers, the surface and the target formation. • The top cement is required to have a minimum of 150m of cement above the target formation. • The target formation is underlain by low permeable basement and overlain by a bounding coal seam. • Low permeability of the target formation and adjacent formations and the horizontal and vertical distances to the existing bores. • Small fluid volumes and pumping draw fluids into the well rather than outward. • Geotechnical planning including the Mechanical Earth Model to provide key technical information. • Undertake a risk assessment for each well that a HFS activity is undertaken. • Previous experience undertaking HFS activities.
	• Migration via existing continuity between formation water and adjacent aquifers	**8**	**Low**	
	• Migration via fractres generated by allowing continuity between target horizon and adjacent aquifers	**8**	**Low**	
	• Migration via the outside of the drilled well should the seals between horizons prove to be incomplete to weakened during HFS	**8**	**Low**	
	HFS fluid remains in the target formation impacting groundwater.	**8**	**Low**	The Upper Tinowon is not an aquifer and produces very little, highly saline water. Due to low porosity, hydraulic fracturing (HFS) is required to boost gas and condensate output. Unlike CSG wells, conventional wells return only 60-70% of HFS flowback; the remaining 30-40% stays in the formation. The risks to groundwater is minimal for the following reasons:

Aspect	Potential Consequences	Associated Activity & Mitigations (Table 33)	Residual Risk	Comments
				• The Upper Tinowon is unsuitable for future groundwater use given its depth, poor water quality, and very low water production. • The negligible likelihood of subterranean ecosystem occurrence within the Upper Tinowon Sandstone. • The negligible likelihood of pathways from the Tinowon Sandstone to shallower aquifers where subterranean ecosystems could occur. The Upper Tinowon is geologically confined from other usable aquifers. • Any chemical or physical changes associated with fracture stimulation predicted to be confined to the stimulated interval and limited to a short distance from the well, meaning any groundwater changes are unlikely to reach sensitive ecological receptors. • OGT's controls ensure any retained HFS is confined within the formation with no exposure to aquifers. • If small amounts of water are produced during the life of the tenure, it will be managed at Silver Springs Facility. See Appendix E for further information.
Land	Soil contamination leading to: • Damage to agricultural production or other land uses • Damage to native vegetation and wildlife habitat • Erosion or release of sediment to land, water or air (dust)	**1, 2, 4, 8**	**Low**	HFS does not expand beyond the existing disturbed areas. The project footprint remains confined to previously disturbed land and avoids additional environmental impacts. Low hazard dams will be preferentially located on existing disturbances. If they can not be developed on existing disturbance OGT will site the dams to minimize impacts on environmental receptors.
Biodiversity	Additional land clearing leading to: • Loss of habitat connectivity and creation of fragmented populations • Loss of endangered, rare and vulnerable species • Loss of fauna habitat • Spread and competition from weeds leading to displacement of agricultural crops or native flora	**2**	**Low**	The detailed ecology assessment (Section 6.3) conducted in July 2025, did not identify any significant threatened fauna or flora within the disturbance footprint.
Nuisance (air pollutants,	Generation of nuisance elements from traffic and HFS activities: • Reduction of air quality	**3, 5, 6, 8**	**Low**	Given the short duration of the project and the absence of sensitive receptors within 2 km of the disturbance footprint, the likelihood of localized air pollution from fuel-burning equipment and construction activities is minimal.

Aspect	Potential Consequences	Associated Activity & Mitigations (Table 33)	Residual Risk	Comments
dust, noise, light etc.)	• Temporary reduction in amenity associated with dust, noise and light • Impacts to flora and fauna			
Waste	Soil and water, including groundwater, contamination leading to: • Health risks to the community and the workforce • Adverse effects on native wildlife and vegetation	**1, 4, 7**	**Low**	All wastes are removed offsite by licensed contractors for disposal.
Noise	Increase noise and vibration levels during the activities.	**6, 7, 8**	**Low**	Alignment with existing noise conditions will limit noise impacts on sensitive receptors.
Greenhouse gas	Additional release of GHG from project activities including equipment use and fugitive releases of gas	**5, 7, 8**	**Low**	GHG abatement plan and ongoing reductions during project activities will reduce the release of GHGs incrementally.
Cultural heritage	Additional land clearing leading to the: • Destruction of cultural heritage significant sites	**2**	**Low**	There will be no significant expansion beyond the existing disturbed areas. The project footprint remains confined to previously disturbed land and avoids additional environmental impacts.

9. Underground Water Rights

Section 227AA(1)(b) of the EP Act, states that an amendment application must state the matters mentioned in section 126A(2) of the EP Act, if the proposed amendment involves changes to the exercise of underground water rights.

Underground water rights in Queensland are regulated by the Water Act 2000, which provides resource tenure holders the authority to access and manage groundwater for mining and petroleum activities. The Act outlines strict obligations to protect existing users and the environment, requiring baseline assessments, impact monitoring, and remediation when groundwater resources are affected by resource activities.

The proposed amendment does not involve changes to the exercise of underground water rights.

In reaching this conclusion, consideration has been given to DES' guideline "Requirements for site-specific and amendment applications—underground water rights" (Underground Water Rights Guideline) (DES 2021).

The Underground Water Rights Guideline provides guidance at section 1.1.14 in relation to when the information requirements under sections 126A and 227AA of the EP Act must be provided for an amendment application.

Table 35 sets out OGT's position in relation to each of the examples included in the Underground Water Rights Guideline.

Table 35 Underground Water Rights Assessment

Example (as per Section 1.1.4 of the Underground Water Rights Guideline)	OGT Response
There is a change in tenure, for example converting an ATP to a PL	**Not Applicable** The EA Amendment does not involve a change in tenure.
Adding a new tenure to the EA	**Not Applicable** The EA Amendment does not involve adding a tenure to the EA.
There is a significant change to the nature or scale of activities	**Not met** The Proposed Activity is not considered a significant change to the nature or scale of activities currently permitted under the EA. The EA authorises a Petroleum activity (petroleum lease) at PL1158 (PL202). The Proposed Activity does not involve any change to the nature or scale of the authorised activity itself but rather would introduce strata stimulation activities as part of the processes used in carrying out the authorised activity.
There is a significant change to the volumes of water proposed to be taken	**Not met** The Proposed Activity does not result in a significant change to the volumes of water proposed to be taken. Currently, the activities at PL1158 (PL202) do not result in any taking of significant quantities of groundwater as part of petroleum production or testing for petroleum production. Due to the poor permeability within the target formation there will be small quantities of groundwater volumes produced during the Proposed Activity. The activities involve injecting fluids into the formation to induce fracturing and release hydrocarbons. The process can result in the abstraction of a relatively small volume of groundwater from the formation. Recent HFS activities in the same target formation indicate that an increase in groundwater take from the Tinowon Formation as part of the fracturing process is minimal. It should be noted, groundwater volumes taken as part of the fracturing process at the Churchie field are so low they have not been recorded. This is likely due to the low permeability of sandstone and yield formation. It would be expected that same conditions are present in PL1158 (PL202), such that any groundwater removed from injecting fluids would be extremely low.

Example (as per Section 1.1.4 of the Underground Water Rights Guideline)	OGT Response
	An extremely minor take of groundwater as part of Proposed Activity would not result in a significant change to volumes water taken. The change would be nominal. The likely volume groundwater take as a result Proposed Activity should be considered in light of the fact the target formation (Tinowan Formation) is a deep tight gas sandstone reservoir, in contrast to the majority of hydraulic strata stimulation in Queensland undertaken in relation to CSG projects, which involve shallow coal seam gas formations where groundwater including GAB units will be a relevant consideration for the project.
There are likely different impacts on environmental value	**Not met** As discussed in Section 8, there are not expected to be any significant impacts on environmental values as a result of the proposed stimulation activities. Sections 8 concludes following the proposed HFS conditions, including the HFS risk assessment for each well controls the potential risks at each location. This includes the use of HFS fluids from various contractors. That being said, we know the HFS process reduces the concentration of organic chemicals in the fluid mixture, assisting in decreasing the overall environmental hazard profile of the fluid. In addition, the assessment shows no risk of impact on environmental values from chemicals remaining in the Target Formation. The Target Formation is not considered a beneficial aquifer in this region due to the low permeability and subsequent low yield of groundwater. In any event, available data collected from the Bowen Basin indicates groundwater of relatively high salinity, with high fluoride occurrences (DES, 2020). In summary, the Proposed Activity does not result in different impacts to environmental values due to: • The unlikelihood that stimulation activities could possibly cause connections between the Target Formation and surrounding aquifers; • The low permeability of the target formation and low yield of groundwater; • The poor water quality of the target formation making it unusable for other purposes; • The limited potential for stimulation fluid chemicals being able to contaminate the Target Formation or underground water in surrounding aquifers.

10. Assessment Level Decision

DETSI assessment level decision is ‘not a minor amendment’ (otherwise known as a major amendment). This decision was supported by the request for information that is supplied in Appendix A .

11. Application Requirements

Section 226 of the EP Act sets out the requirements for making an application to amend an environmental authority. Table 38 lists these requirements and where they are addressed in the application material.

Table 36 Mandatory Application requirements

Section		Requirement	Where addressed in application material
226 Requirements for amendment applications generally			
(1)	An amendment application must—		
	(a)	be made to the administering authority; and	(The application and this supporting information)
	(b)	be in the approved form; and	(The application and this supporting information)

Section				Requirement	Where addressed in application material
	(c)			be accompanied by the fee prescribed by regulation; and	(Provided to accompany the application and this supporting information)
	(d)			describe the proposed amendment; and	• Section 4 describes the proposed amendments. • Section 4.1 provides the proposed conditions • Section 4.2 provides the amendment rational.
	(e)			describe the land that will be affected by the proposed amendment; and	• Section 2 provides a description of the tenure. • Section 6.2 Provides an overview of Land within PL1158 (PL202)
	(f)			include any other document relating to the application prescribed by regulation.	EA Application Supporting Information PL1158 (PL202)
(2)	However, subsection (1)(d) and (e) does not apply to an application for a condition conversion.				**Not applicable**
226A Requirements for amendment applications for environmental authorities					
(1)	If the amendment application is for the amendment of an environmental authority, the application must also				
	(a)			describe any development permits in effect under the Planning Act for carrying out the relevant activity for the authority; and	**Not applicable**
	(b)			state whether each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity; and	N/A The application related to a site specific EA amendment and the eligibility criteria do not apply.
	(c)			if the application states that each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity—include a declaration that the statement is correct; and	N/A The application related to a site specific EA amendment and the eligibility criteria do not apply.
	(d)			state whether the application seeks to change a condition identified in the authority as a standard condition; and	N/A The application related to a site specific EA amendment and the eligibility criteria do not apply.
	(e)			if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit; and	**Not applicable**
	(f)			include an assessment of the likely impact of the proposed amendment on the environmental values, including—	
		(i)		a description of the environmental values likely to be affected by the proposed amendment; and	Section 6
		(ii)		details of emissions or releases likely to be generated by the proposed amendment; and	Section 6.7
		(iii)		a description of the risk and likely magnitude of impacts on the environmental values; and	Section 8
		(iv)		details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and	Section 8
		(v)		if a PRCP schedule does not apply for each relevant activity—details of how the land the subject of the application will be rehabilitated after each relevant activity ends; and	**Not applicable**
	(g)			include a description of the proposed measures for minimising and managing waste generated by amendments to the relevant activity; and	Section 8.2.5

Section				Requirement	Where addressed in application material
	(h)			include details of any site management plan or environmental enforcement order issued under section 362(1) that relates to the land the subject of the application.	No environmental enforcement order issued for PL1158 (PL202)
(2)	Subsection (1)(f) does not apply for an amendment application for an environmental authority if—				
	(a)			either—	
		(i)		the process under chapter 3 for an EIS for the proposed amendment has been completed; or	**Not applicable**
		(ii)		the Coordinator-General has evaluated an EIS for the proposed amendment and there are Coordinator-General's conditions that relate to the proposed amendment; and	**Not applicable**
	(b)			an assessment of the environmental risk of the proposed amendment would be the same as the assessment in the EIS mentioned in paragraph (a)(i) or the evaluation mentioned in paragraph (a)(ii).	**Not applicable**
(3)	Also, subsection (1)(a), (d), (e), (f), (g) and (h) does not apply to an application for a condition conversion.				**Not applicable**
(4)	Despite subsection (1)(f), (g) and (h), if the amendment application is for an environmental authority for the prescribed ERA mentioned in the *Environmental Protection Regulation 2019*, schedule 2, section 13A—				
		(a)		it need only include the matters mentioned in subsection (1)(f)(i) to (iv), (g) and (h) to the extent the matters relate to fine sediment, or dissolved inorganic nitrogen, entering the water of the Great Barrier Reef or Great Barrier Reef catchment waters; and	**Not applicable**
		(b)		subsection (1)(f)(v) does not apply for the amendment application.	**Not applicable**
227AA Requirements for amendment applications—underground water rights					
(1)	This section applies for an amendment application if—				
	(a)			the application relates to a site-specific environmental authority for—	
		(i)		a resource project that includes a resource tenure that is a mineral development licence, mining lease or petroleum lease; or	Section 9
		(ii)		a resource activity for which the relevant tenure is a mineral development licence, mining lease or petroleum lease; and	Section 9
	(b)			the proposed amendment involves changes to the exercise of underground water rights.	**Not applicable**
(2)	The application must also state the matters mentioned in section 126A(2).				**Not applicable – Not a CSG tenure**
(3)	In this section— ***site-specific environmental authority*** means an environmental authority that includes 1 or more ineligible ERAs.				

12. Financial Assurance

The current financial assurance held by OGT for the PL1158 (PL202) EA is $335,684.79. Financial assurance currently held adequately covers the proposed activities.

13. Acronyms and Abbreviations

Acronym and Abbreviations	Definition
AGL Energy	AGL Gas Storage Pty Ltd, AGL Upstream Gas (MOS) Pty Ltd
APPEA	Australian Petroleum Production and Exploration Association now known as Australian Energy Producers
BTEX	Benzene, toluene, ethylbenzene, xylenes
CoAG	Council of Australian Governments
CSG	Coal Seam Gas
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DETSI	Department of Environment, Tourism, Science and Innovation
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
EA	Environmental Authority
EA amendment	The application
EAR	Environmental assessment report by Boobook Ecological Consulting
EP Act	Environmental Protection Act 1994 (Qld)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPP	Environmental Protection Policy
ERC	Estimated Rehabilitation Cost
ESA	Environmentally Sensitive Area
EVs	Environmental values
GAB	Great Artesian Basin
GDE	Groundwater dependent ecosystem
GES	General Ecologically Significance
GHG	Greenhouse Gas
GPF	Gas Processing Facility
Guidelines	Greenhouse Gas Emissions EP Act 1994 Guidelines (June 2025)
ha	Hectares
HES	High Ecological Significance
HFS	Hydraulic Fracture Stimulation
km	Kilometers
m	meters
MEM	Mechanical Earth Model
ML	Megalitre
MNES	Matters of National Environmental Significance
Mosaic	Mosaic Oil Qld Pty Ltd.
MSES	Matters of State Environmental Significance
NC Act	Nature Conservation Act 1992 (Qld)
OGT	OGT Energy Pty Ltd
P&A	Plugged and abandoned

Acronym and Abbreviations	Definition
PAH	Polycyclic aromatic hydrocarbons
PBT Chemicals	Persistent, bioaccumulating and toxic chemicals
PL	Petroleum Lease
PPL	Petroleum Pipeline Licence
PMST	Protected Matters Search Tool
Proposed Activity	Hydraulic Fracture Stimulation and associated activities
SAR	Sodium adsorption ratio
SCA	Strategic Cropping Area
SCL	Strategic cropping land
SIMP	Stimulation Impact Monitoring Program
SLC	Special Least Concern
SSP	Silver Springs Gas Plant
Target formation	Upper Tinowon Sandstone formation
TEC	Threatened Ecological Communities
VM	Vegetation Management
WoNS	Weeds of National Significance
WLPG	Wallumbilla LPG Plant
WPA	Wetland Protection Areas

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Appendix A DETSI Information Request

Notice

Environmental Protection Act 1994

Information request

This information request is issued by the administering authority under section 140 of the Environmental Protection Act 1994 *to request further information needed to assess an amendment application for a site-specific environmental authority.*

To: OGT Energy Pty Ltd
Level 27, 10 Eagle Street
BRISBANE QLD 4000

ATTN: Lucinda Snelling

Our reference: P-EA-100227919; 101/0051154

Further information is required to assess an amendment application for environmental authority

1 Application details

The amendment application for a site-specific environmental authority was received by the administering authority on 25 November 2026.

The application reference number is: A-EA-AMD-100983619

Land description: Petroleum Lease (PL) 202 (PL1158)

2 Information request

The administering authority has considered the abovementioned application and is writing to inform you that further information is required to assess the application (an information request).

The information requested is provided below:

1) Wells authorised under the environmental authority (EA) (P-EA-100227919)

According to section 4.2 of the supporting information, there are currently 4 producing wells within PL202 (PL1158) as listed below:

Waggamba-1
Waggamba-3
Waggamba-4H
Waggamba-5H

However, Waggamba-1 is not listed in Table 5 and Waggamba-3 has been listed as “shut-in” rather than “producing”.

Information requested

1.1 Review and update Table 5 to ensure the status of all wells is accurately reflected.

2) Previous stimulation

According to the supporting information, wells in the area have historically undergone stimulation treatments, particularly the conventional wells. This was primarily due to the tight nature of the target formation, which typically exhibits low permeability and limited natural flow capacity. The wells Churchie-1 and Namarah-1 were specifically mentioned as they were known to have been stimulated, both targeted the same reservoirs at similar depths and geologic conditions, and the stimulation was completed successfully.

Information requested

2.1 Provide further details as below:
   a) Chemical composition of the fraccing fluid utilised.
   b) Quantity (litres) of fraccing fluid utilised.
   c) Percentage of fraccing fluid recovered.
   d) Pre and post fraccing groundwater quality.

2.2 Provide a comparison of the bore log data, to identify how the target depths and geological formations of the proposed wells align with those of the existing wells (e.g. Churchie-1 and Namarah-2).

3) Wetlands

The supporting information references the Map of Queensland Environmental Values (DETSI 2025d), which identifies the presence of a wetland of general ecological significance (GES) near the western boundary of the PL, as well as within its associated trigger area. However, the assessment concludes that neither the GES wetland nor its trigger area intersect the PL.

Information requested

3.1 Please clarify if the proposed activities will impact the GES wetland or the trigger area.

4) Groundwater quality – baseline data

The supporting information indicates that the target formation, the Upper Tinowon Sandstone, is not classified as a beneficial aquifer. This is due to its low permeability, which results in limited groundwater yields. Additionally, water quality data reveals relatively high levels of salinity and fluoride within the formation. Furthermore, the presence of naturally occurring hydrocarbons further restricts the potential beneficial use of the groundwater.

The GasFields Commission's report indicates that the connectivity between aquifers across the Surat, Bowen, and Galilee Basins is low. Within the Bowen Basin, water movement through the Tinowon Sandstone and other sandstone aquifers is believed to occur at a very slow rate, leading to prolonged groundwater residence times. As a result, these aquifer systems are expected to demonstrate significant delays in response to external stresses or impacts, as well as extended recovery periods.

It is estimated that less than half of the fraccing fluid volume will be recovered upon completion of well stimulation. Furthermore, no baseline data has been provided to substantiate the assertion that the groundwater has no potential beneficial use. Given the slow movement of groundwater, it is critical to obtain reliable information on both its hydraulic conductivity and overall quality.

Information requested

4.1 Further information/evidence is required to substantiate the claim that the Upper Tinwon Sandstone is not a beneficial aquifer.

4.2 Given the slow movement of groundwater, has any testing been conducted to determine the hydraulic conductivity or the residence time of the Upper Tinowon Sandstone? If so, please provide the results.

4.3 Has any sampling of groundwater (or produced water) been conducted? If so, please provide the results.

5) Subterranean ecosystem

The application does not include any description or assessment of the subterranean ecosystem that could potentially be impacted by the proposed use of fraccing fluid for hydraulic stimulation. Subterranean

ecosystems, which include groundwater-dependent ecosystems, stygofauna (aquatic organisms living in groundwater), and microbial communities, are highly sensitive and play a critical role in maintaining ecological balance and water quality. These ecosystems are often poorly understood and can be particularly vulnerable to disturbances, such as contamination or changes in water chemistry caused by the introduction of fraccing fluids. As such, the potential impacts of fraccing fluid on these ecosystems must be clearly identified, and appropriate mitigation measures proposed to minimise environmental harm.

Information requested

5.1 Provide a risk assessment of potential impact of fraccing on the subterranean ecosystem.

6) Low hazard dam

It is noted that the proposed activities include construction of a 1.4ha low hazard dam for storage of flowback water.

Information requested

6.1 Additional information is required on the calculation of the size of the dam.
6.2 Provide information on any treatment system to be employed for treatment and disposal.
6.3 Quantity and quality of flowback water expected following stimulation activities.
6.4 Method of disposal of treated/untreated flowback water.
6.5 Provide the GPS coordinates of the location of the dam.

7) Noise

There are two sensitive receptors located on the western side of PL1158, on Teelba Road. Both appear to be residential dwellings. It is not known exactly how far these receptors are from the activity area. The acoustic profile is that of a rural setting which is likely to be significantly affected by the construction noise. The current EA includes a requirement to undertake a noise assessment prior to undertaking petroleum activities that are likely to impact a sensitive receptor. Additionally, there is a table (Schedule G: Table 1 — Noise Limits at Sensitive Receptors) that describes the noise limits that must not be exceeded unless there is an agreed alternative arrangement with the affected person. There have been petroleum activities undertaken on PL1158, it is not clear if there was any noise assessment conducted as per the EA condition.

Information requested

7.1 Please provide results of any noise monitoring undertaken to confirm that there will not be any impacts to sensitive receptors.

3 Actions

The abovementioned application will lapse unless you respond by giving the administering authority -

(a) all of the information requested; or

(b) part of the information requested together with a written notice asking the authority to proceed with the assessment of the application; or

(c) a written notice –

i. stating that you do not intend to supply any of the information requested; and

ii. asking the administering authority to proceed with the assessment of the application.

Should the information request require an EIS process or applicant to submit a progressive rehabilitation and closure (PRC) plan then it must be completed and submitted.

A response to the information requested must be provided by **13 July 2026** (the information response period). If you wish to extend the information response period, a request to extend the period must be made at least 10 business days before the last day of the information response period.

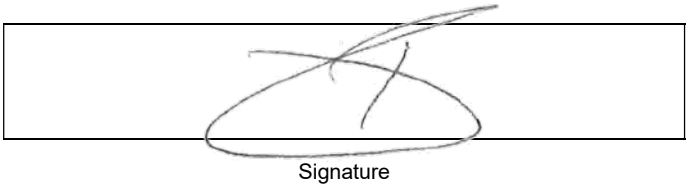
The response to this information request or a request to extend the information response period can be submitted to the administering authority by email to EnergyandExtractive@detsi.qld.gov.au.

If the information provided in response to this information request is still not adequate for the administering authority to make a decision, your application may be refused as a result of section 176 of the *Environmental Protection Act 1994,* where the administering authority must have regard to any response given for an information request.

4 Human rights

A human rights assessment was carried out in relation to this decision/action and it was determined that no human rights are engaged by this decision/action.

Should you have any questions about the notice, please contact the department using the details provided below.



Signature

12 January 2026

Date

Tristan Roberts

Department of the Environment, Tourism, Science and Innovation
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:

Energy and Extractive Resources Business Centre
GPO Box 2454, Brisbane QLD 4001
Phone: (07) 3330 5715
Email: EnergyandExtractive@detsi.qld.gov.au

Appendix B Churchie 1 HFS Report

Post Job Report
Hydraulic Fracture Stimulation

Job Description:	Fracture Stimulation
Prepared By:	James Tuohy
Client:	Mosaic
Location:	Surat, QLD
Well No.:	Churchie 1
Date:	24th May 2010

Table of Contents

1. SUMMARY

Figure 1. Treatment plot for the all fracture diagnostic injection testing (Step Rate, Step Down, MiniFrac/DFIT).

Operation	Date	Start Time	Stop Time	Vol (bbls)	Rate (bpm)	Pressure (psi)
Frac Zone Tinowon	24/5/10	07:31	08:38	1647.5	25	4940

Churchie Zone 1 was Fracced with X-Linked Medallion fluid.

2. WELL DETAILS

Table 1. Admin

Well	Fluid Type	Stage #	Pumps #	# Pay Zones
Churchie 1	Water + Gas	1	4	1

Table 2. Tubular/Perforation Details

Perf No.	Seam	Top (m)	Bottom (m)	SPF	No.	Dia.
1	Tinowon	2096	2099.7	3	2	0.35

Casing OD (in)	Casing Weight (lbs/ft)	Casing bottom (ft)	Pwf (psi)	Pwh (psi)	Twh (F)	Casing Top (ft)	Packer Depth (ft)	Tubing OD (in)	Tubing weight (lbs/ft)	Tubing Bottom (ft)
7	23	7359.2	499.5	2860	189	0	6810.79	3.5	9.3	N/A

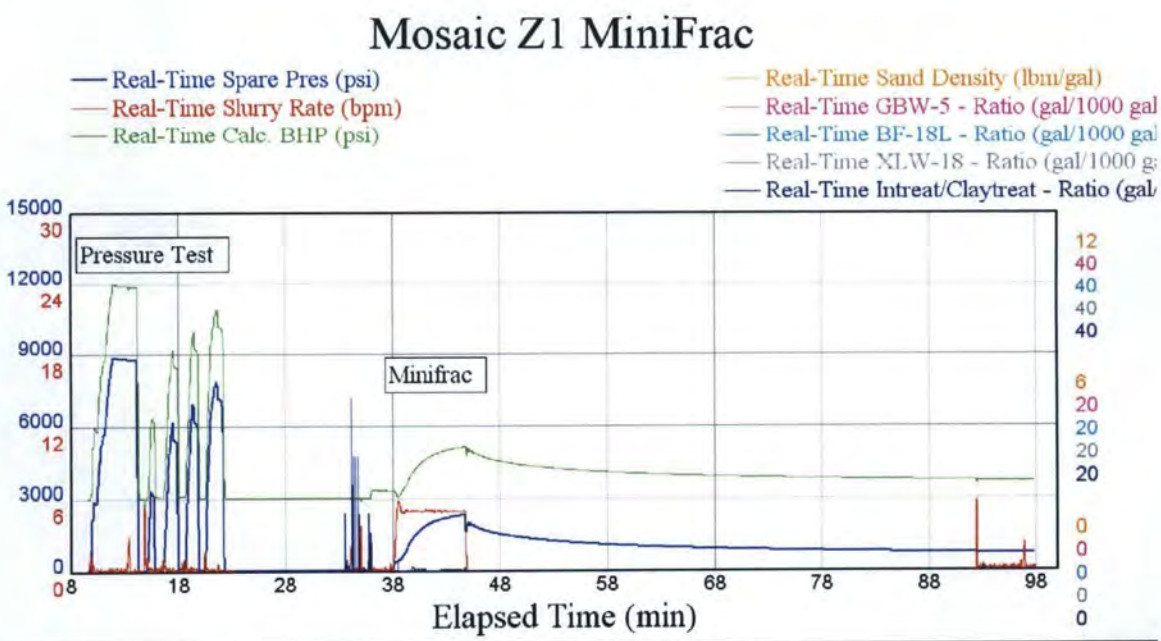
# perforated intervals	Top Perf depth (ft)	Bottom Perf depth (ft)	SPF	Phasing	CBL Status	Gun Type
1	6876.9	6889.1	3	60	-	-

Table 3. Reservoir Details

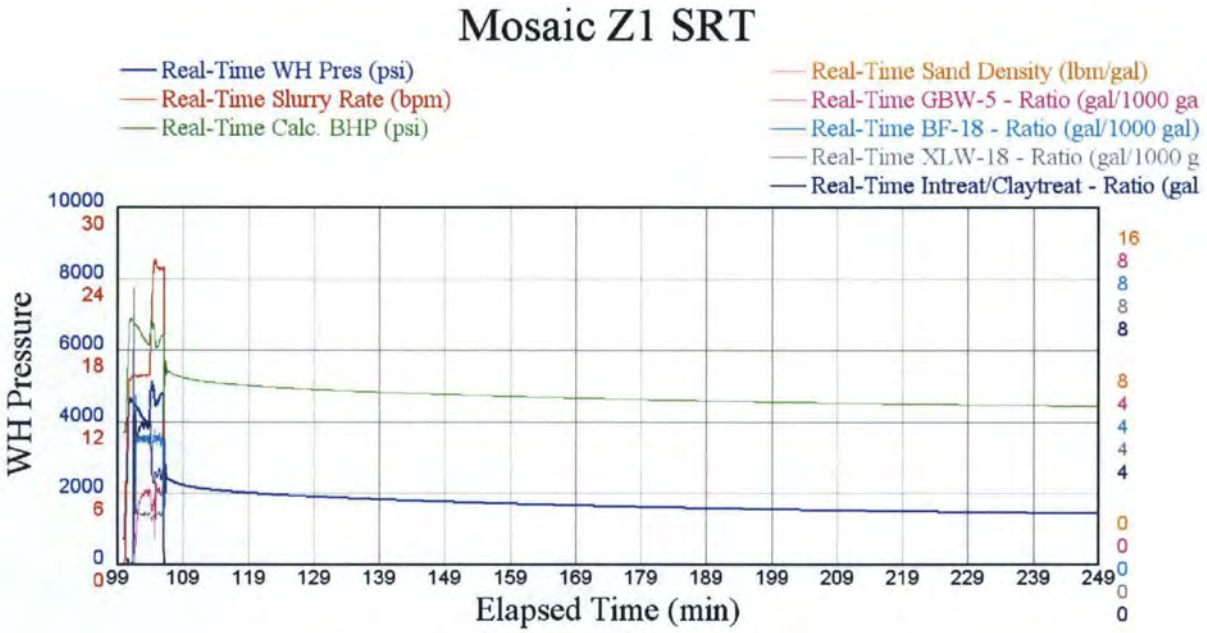
Reservoir name	Reservoir Type	Net Pay (ft)	Reservoir pressure (psi)	Reservoir Temperature (F)	Porosity (%)	Permeability (DFIT/Minifrac) (md)	Permeability (DST) (md)
Tinowon	Sandstone	12.2	3460	189	17	0.08	0.08

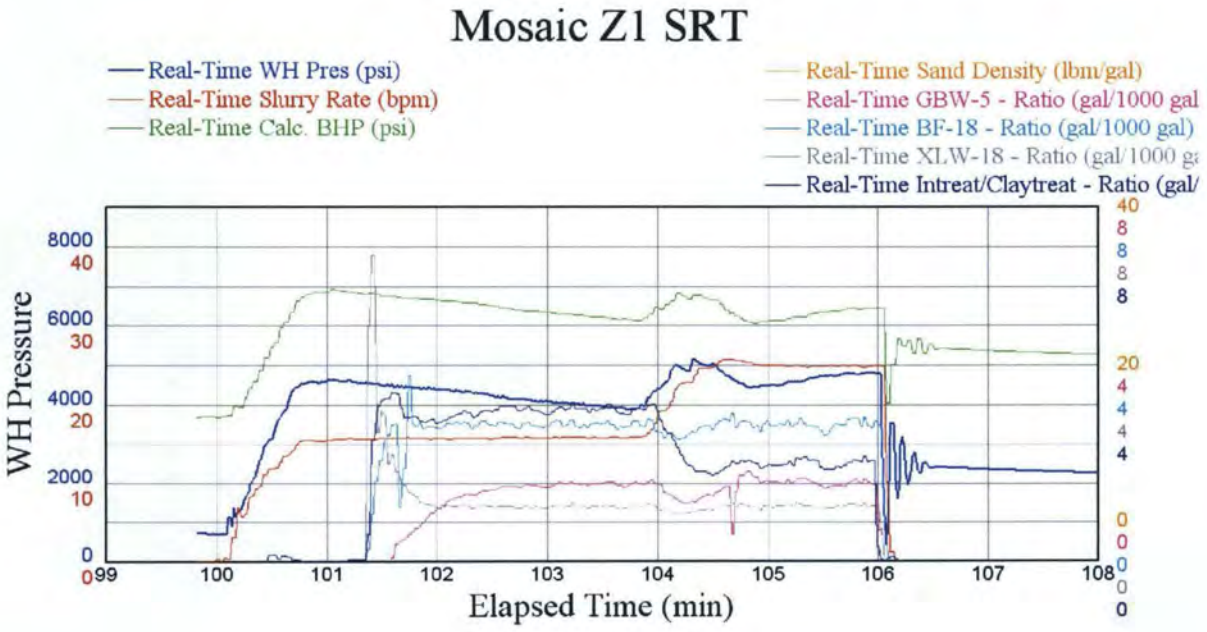
Total Skin	SW (%)	Poisson Ratio	Young Modulus (E6 psi)	Fracture Gradient (psi/ft)	Closure Pressure (psi)
N/A	100	0.25	2,000,000	0.744	4598

Minifrac



Stepdown Test



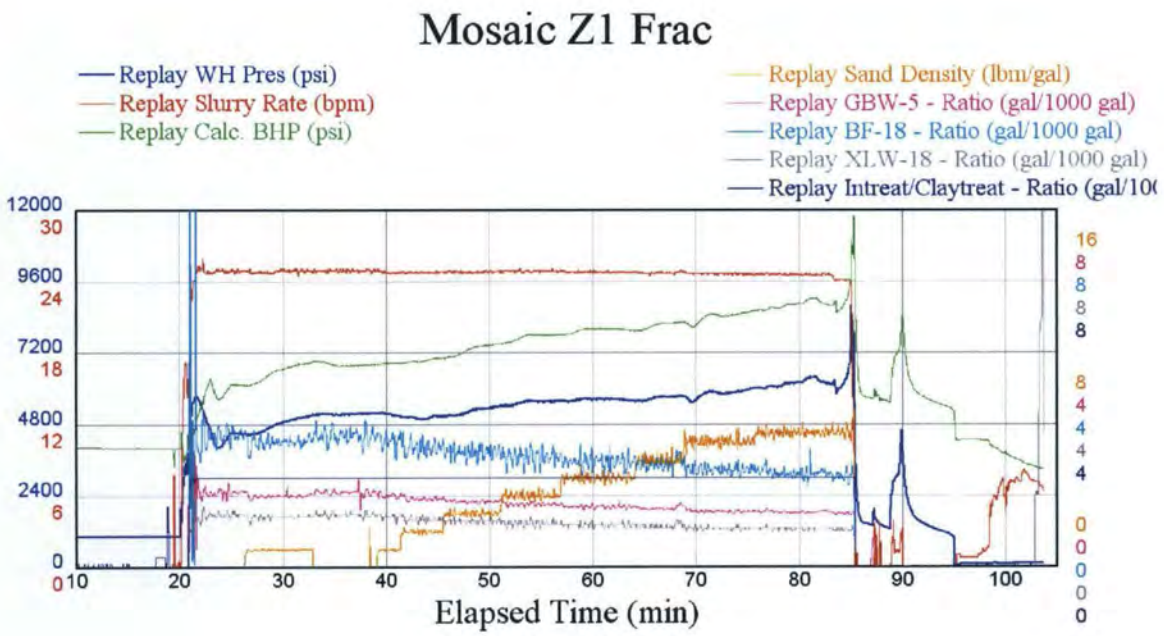


3. MAIN TREATMENT

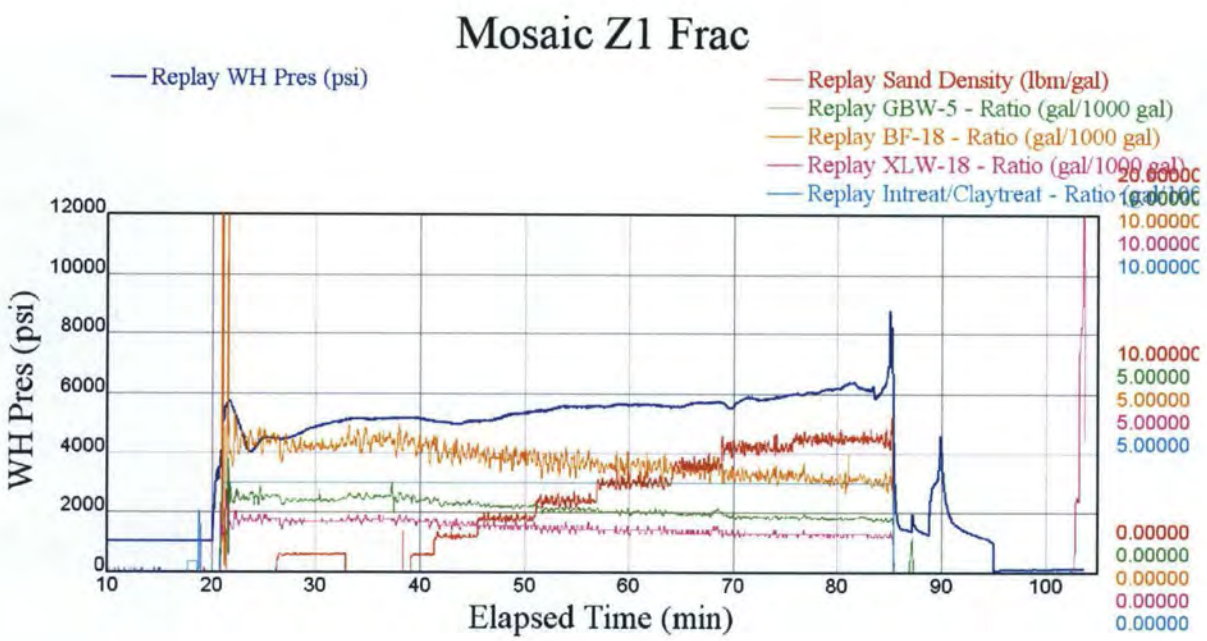
Table 7. Main Treatment Summary

Fluid	Propant 1	Propant 2	Pad Volume (gal)	Pad %	Total fluid Volume (gal)	Pumped propant (lbs)
X-Link	2040	1630	6006	30	69,195	194801

Propant in the formation (lbs)	Propant final conc. (lbs/gal)	Rate (BPM)	Early Screen out
182801	7.5	25	Yes



Chemicals



Additive Schedule

Blender Unit (Liquid Chemicals)																		
BF-18L			ClayMaster 5C			Intreat (Inflo 250+ Cletreat 3C)			XLW-18			GBW-5			GLFC-3B		
Conc. gpt	Rate gpm	Total gal	Conc. gpt	Rate gpm	Total gal	Conc. gpt	Rate gpm	Total gal	Conc. gpt	Rate gpm	Total gal	Conc. gpt	Rate gal	Total gal	Conc. gpt	Rate gpm	Total gal
3.50	3.68	21.00	2.00	2.10	12.00	4.00	4.20	24.00	1.40	1.47	8.40	2.00	2.10	12.00	7.00	7.35	42.00
3.50	3.68	21.00	2.00	2.10	12.00	4.00	4.20	24.00	1.40	1.47	8.40	2.00	2.10	12.00	7.00	7.35	42.00
3.50	3.68	28.35	2.00	2.10	16.20	4.00	4.20	32.40	1.40	1.47	11.34	2.00	2.10	16.20	7.00	7.35	56.70
3.50	3.68	8.75	2.00	2.10	5.00	4.00	4.20	10.00	1.40	1.47	3.50	2.00	2.10	5.00	7.00	7.35	17.50
3.50	3.68	13.13	2.00	2.10	7.50	4.00	4.20	15.00	1.40	1.47	5.25	2.00	2.10	7.50	7.00	7.35	26.25
3.50	3.68	17.50	2.00	2.10	10.00	4.00	4.20	20.00	1.40	1.47	7.00	2.00	2.10	10.00	7.00	7.35	35.00
3.50	3.68	17.50	2.00	2.10	10.00	4.00	4.20	20.00	1.40	1.47	7.00	2.00	2.10	10.00	7.00	7.35	35.00
3.50	3.68	21.88	2.00	2.10	12.50	4.00	4.20	25.00	1.40	1.47	8.75	2.00	2.10	12.50	7.00	7.35	43.75
3.50	3.68	25.38	2.00	2.10	14.50	4.00	4.20	29.00	1.40	1.47	10.15	2.00	2.10	14.50	7.00	7.35	50.75
3.50	3.68	30.89	2.00	2.10	17.65	4.00	4.20	35.30	1.40	1.47	12.36	2.00	2.10	17.65	7.00	7.35	61.78
3.50	3.68	13.13	2.00	2.10	7.50	4.00	4.20	15.00	1.40	1.47	5.25	2.00	2.10	7.50	7.00	7.35	26.25
3.50	3.68	15.93	2.00	2.10	9.10	4.00	4.20	18.20	1.40	1.47	6.37	2.00	2.10	9.10	7.00	7.35	31.85
			2.00	2.10	5.10	4.00	4.20	10.20							7.00	7.35	17.85
															7.00	0.00	0.00
		234.41			139.05			278.10			93.77			133.95			486.68

10. APPENDIX 5 – MAIN TREATMENT PUMP SCHEDULE

INPUT SURFACE TREATMENT SCHEDULE

Schedule Type	Surface
Wellbore Fluid Type	ME28
Fraction of Well Filled	1

Stage No.	Slurry Rate (bpm)	Stage Volume (bbl)	Slurry Stage (min)	Time	Stage Type	Fluid Type	Prop Type	Prop Factor	Damage
1	25	142.9	5.7		Pad	FW	0000	0	
2	25	149.3	6.0		Slug	ME28	0001	0	
3	25	192.9	7.7		Sweep	ME28	0000	0	
4	25	62.2	2.5		Prop	ME28	0002	0	
5	25	97.4	3.9		Prop	ME28	0002	0	
6	25	135.2	5.4		Prop	ME28	0002	0	
7	25	140.6	5.6		Prop	ME28	0002	0	
8	25	182.5	7.3		Prop	ME28	0002	0	
9	25	219.5	8.8		Prop	ME28	0002	0	
10	25	276.7	11.1		Prop	ME28	0002	0	
11	25	117.6	4.7		Prop	ME28	0002	0	
12	25	145.1	5.8		Prop	ME28	0003	0	
13	25	60.7	2.4		Flush	LN28	0000	0	

Fluid Type: FW - Fresh Water	93.8	(bbl)
Fluid Type: LE28 - Medallion 2800	232.1	(bbl)
Proppant Type: 0001 – 100 Mesh Slug	6591	(lbm)
Proppant Type: 0002 - 20/40 Jordan Sand	18425	(lbm)
Proppant Type: 0003 - 16/30 Jordan Sand	10545	(lbm)

Total Slurry Volume	1647.5	(bbl)
Total Liquid Volume	1432.8	(bbl)
Total Proppant Mass	194801	(lbm)

11. APPENDIX 6 – QA/QC

BJ SERVICES COMPANY

FRACTURING SERVICES

TECHNICAL REPORT

APPENDIX 5 - QA/QC Form For Water Based Fluids- Version 9.5

Date	22-May-10	Well Name	Churchie 1	Frac Company	BJ Services

Pre-Frac Results

Water	Acceptable Range	Lab Value	Cross-link Proppant Suspension Test			Water Sample № 1	Water/Methanol Sample	
Fluid Source	----------	----------	Min @ BHST	Description	Viscosity, cp	Surat	Surat	
Transport Condition	----------	----------	30 min	N/A		GOOD	GOOD	
Volume, bbl	----------	----------	60 min	N/A		1,936	1,936	
Bacteriacide Conc, gpt	----------	----------	90 min	N/A		0.10	0.10	
Date Bact. Added	----------	----------	120 min	N/A		23/05/2010	23/05/2010	
Temp (C)	"	"	Proppant Settling Comments:			23	23	
Specific gravity, s.g.	"	"				1	0.95	
Clarity, color	"	"				Clear	Clear	
Odor (none or describe)	"	"	Average Temp, °C :			None	Methanol	
pH	< 8	"	General Comments:			5.5	5.5	
Ferrous Iron, mg/l	< 10	"	Added Acetic Acid to water sample to lower pH.			<10		
Total Iron, mg/l	< 30	"				<30		
Sulfate, mg/l	<10	"				<10		
Chlorides, mg/l	< 1000	"				<1000		
Total hardness, mg/l	< 500	"				<500		
Bicarb, mg/l	< 1000	"				<1000		

Gel	Viscometer Oil Calibration			Temp C = 23		Measured visc @ 300 rpm = 21			Correct Visc @ 300 rpm = 20-25			
	Additives	Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name
		Gel	GLFC-5	7 gpt	XL	XLW-18	1.4 gpt	Surfactant	Intreat	4 gpt	Biocide	Magnacide
		Generic	Trade Name		Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name
		Clay Stab	Claymaster	2 gpt	Buffer	BF-18L	3.5 gpt	Breaker	GBW-5	2 gpt	Breaker	
	Lab	Acceptable Variance	[illegible]		Tank #1		Tank #2		Tank#3		Tank#4	
Gel added, gal	N/A	"	[illegible]		7 gpt		7 gpt		7 gpt		7 gpt	
Calculated gel loading	N/A	"	[illegible]		28		28		28		28	
pH	N/A	"	[illegible]		6		6		6		6	
Temp, C	N/A	"	[illegible]		21		26		21		21	
Viscosity @ 300 rpm	N/A	"	[illegible]		18.5		25		23		25	
Gel loading from chart	N/A	"	[illegible]		26		28		27		28	
Vortex closure time, sec	N/A	"	[illegible]		1min		1min		1min		1min	
Crown time, sec	N/A	"	[illegible]		1min 20 secs		1min 20 secs		1min 20 secs		1min 20 secs	
XL pH	N/A	"			5		5		5		5	
Appearance (lip?)	N/A	"			Good		Good		Good		Good	
Bacteria test, cp after 1 hr.	+/- 2 cp	+/- 2 cp			0		0		0		0	
Desired Break, min	N/A	"			200		200		200		200	
Sample break, mini	N/A	"			240		240		240		240	
Broken pH	N/A	"			7		7		7		7	

BJ SERVICES COMPANY

FRACTURING SERVICES

TECHNICAL REPORT

APPENDIX 5 - QA/QC Form For Water Based Fluids- Version 9.5

Date: 22-May-10 | Well Name: Churchie 1 | Frac Company: BJ Services

Pre-Frac Results

Water	Acceptable Range	Lab Value	Cross-link Proppant Suspension Test			Water Sample № 1	Water/Methanol Sample	
			Min @ BHST	Description	Viscosity, cp			
Fluid Source	----------	----------	30 min	N/A		Surat	Surat	
Transport Condition	----------	----------	60 min	N/A		GOOD	GOOD	
Volume, bbl	----------	----------	90 min	N/A		1,936	1,936	
Bacteriacide Conc, gpt	----------	----------	120 min	N/A		0.10	0.10	
Date Bact. Added	----------	----------	Proppant Settling Comments:			23/05/2010	23/05/2010	
Temp (C)	"	"				23	23	
Specific gravity, s.g.	"	"				1	0.95	
Clarity, color	"	"				Clear	Clear	
Odor (none or describe)	"	"	Average Temp, °C :			None	Methanol	
pH	< 8	"	General Comments:			5.5	5.5	
Ferrous Iron, mg/l	< 10	"	Added Acetic Acid to water sample to lower pH.			<10		
Total Iron, mg/l	< 30	"				<30		
Sulfate, mg/l	<10	"				<10		
Chlorides, mg/l	< 1000	"				<1000		
Total hardness, mg/l	< 500	"				<500		
Bicarb, mg/l	< 1000	"				<1000		

Gel	Viscometer Oil Calibration			Temp C = 23		Measured visc @ 300 rpm = 21			Correct Visc @ 300 rpm = 20-25			
	Additives	Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name
		Gel	GLFC-5	7 gpt	XL	XLW-18	1.4 gpt	Surfactant	Intreat	4 gpt	Biocide	Magnacide
		Generic	Trade Name		Generic	Trade Name	Loading	Generic	Trade Name	Loading	Generic	Trade Name
		Clay Stab	Claymaster	2 gpt	Buffer	BF-18L	3.5 gpt	Breaker	GBW-5	2 gpt	Breaker	
	Lab	Acceptable Variance	On the Fly Samples		Tank #1							
			Stage	Rig Pump								
Gel added, gal	N/A	"	Mini Van #1	[illegible]	7 gpt							
Calculated gel loading	N/A	"	Pod	[illegible]	28							
pH	N/A	"	Prop 1	[illegible]	6							
Temp, C	N/A	"	Prop 2	[illegible]	21							
Viscosity @ 300 rpm	N/A	"	Prop 3	[illegible]	23							
Gel loading from chart	N/A	"	Prop 4	[illegible]	27							
Vortex closure time, sec	N/A	"	Prop 5	[illegible]	1min							
Crown time, sec	N/A	"	Flush	[illegible]	1min 20 secs							
XL pH	N/A	"			5							
Appearance (lip?)	N/A	"			Good							
Bacteria test, cp after 1 hr.	+/- 2 cp	+/- 2 cp			0							
Desired Break, min	N/A	"			200							
Sample break, mini	N/A	"			240							
Broken pH	N/A	"			7							

Mosaic Medallion Fluid

Total Water Injected	82,000	gals
Total Water Injected (Mass)	683,880	lbs

BJ Services Additive	Na % wt	CAS of Componer	Chemical Component Name	Density SG	ppg	BJ Component Use	UoM	Conc	Totals	UoM
Methanol	1.00	67-56-1	Methanol	0.79	20.25	*Surfactant*	gpt	200.00	16,400.00	gal
ClayTreat 3C	0.60	75-57-0	Tetramethyl ammonium chloride	1.17	9.75	*Clay Control*	gpt	2.00	164.00	gal
BF-18L	0.20	000144-55-8	Acetic Acid	1.26	9.75	*pH Buffer*	gpt	4.00	328.00	gal
BF-18L	0.20	000127-09-3	Sodium acetate	1.53	9.75	*pH Buffer*	gpt	4.00	328.00	gal
GBW-5	1.00	7727-54-0	Ammonium Persulfate	1.90	9.75	*Breaker*	ppt	4.17	341.94	lb
GBW-12CD (1:33)	1.00	-----		1.00	9.75	*Breaker*	gpt	1.00	82.00	gal
ClayMaster-5C	2.00	-----	Quaternary Polyamines	1.14	9.75	*Clay Control*	gpt	2.00	164.00	gal
Inflow-250w	0.15	000111-76-2	2-Butoxyethanol		9.75	*Surfactant*	gpt	2.00	164.00	gal
Inflow-250w	0.25	67-56-1	Methanol	0.79	9.75	*Surfactant*	gpt	2.00	164.00	gal
Inflow-250w	0.60	-----	Proprietary Surfactants	1.20	9.75	*Surfactant*	gpt	2.00	164.00	gal
Magnacide 575	1.00	55566-30-8	Tetrakis(hydroxymethyl)phosphonium sulfate	1.30	9.75	*Bacteriacide*	gpt	0.10	8.20	gal
XLW-18	0.40	197980-53-3	Zirconium complex	6.50	9.75	*Complexor*	gpt	1.40	114.80	gal
XLW-18	0.50	000071-23-8	1-Propanol	0.80	9.75	*Complexor*	gpt	1.40	114.80	gal
XLW-18	0.05	000150-25-4	Bicine	1.00	9.75	*Complexor*	gpt	1.40	114.80	gal
GLFC-3						*Slurried Gel*	gpt	7.00	574.00	gal
GLFC-3 is composed of the below components										
Puredrill	*1.00*	*92045-24-4*	*Gas oils (petroleum), hydrotreated light vacuum*	0.84	*6.96*	*Mineral Oil*	*gpt*	*628.00*	*360.47*	*gal*
PSA-1	*0.01*	*14464-46-1*	*Crystalline silica (cristobalite)*	2.64	*21.98*	*Gel Suspension Agent*	*ppt*	*100.00*	*57.40*	*lb*
PSA-1	*0.01*	*14808-60-7*	*Crystalline silica (quartz)*	2.65	*22.10*	*Gel Suspension Agent*	*ppt*	*100.00*	*57.40*	*lb*
PSA-2L	*1.00*	*24938-91-8*	*Poly (oxy-1,2-ethanediyl)*	0.98	*8.17*	*Gel Suspension Agent*	*gpt*	*4.00*	*2.30*	*gal*
US-40	*1.00*	*111-76-2*	*Ethylene glycol monobutyl ether*	0.90	*7.51*	*Mutual Solvent*	*gpt*	*6.00*	*3.44*	*gal*
Fumaric Acid	1.00	110-17-8	Fumaric Acid	1.64	*7.51*	*pH Buffer*	*ppt*	*40.00*	*22.96*	*lb*
Sodium Bicarbonate	*1.00*	*000144-55-8*	*Sodium Bicarbonate*	2.20	*7.51*	*pH Buffer*	*ppt*	*500.00*	*287.00*	*lb*
GW-38	*1.00*	68130-15-4	*Polysaccharide*	1.30	*7.51*	*Gelling Agent*	*ppt*	*4000*	*2,296.00*	*lb*

Appendix C Terrestrial Ecology Report

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ECOLOGICAL ASSESSMENT REPORT

Waggamba infrastructure, PL 1158

Prepared for OGT Energy

Issue No.	Date	Description	Author	Verifier	Approved
A	31/7/2025	Draft report issued to client	C. Eddie, W. Campbell, N. Taylor, A. Warren	C. Eddie	C. Eddie
0	13/8/2025	Final report issued to client	C. Eddie	-	C. Eddie
1	13/10/2025	Revised report including additional infrastructure	C. Eddie, N. Taylor	-	C. Eddie
2	21/11/2025	Revised report including additional infrastructure	C. Eddie, N. Taylor	-	C. Eddie

Executive Summary

This report summarises results from an ecology survey undertaken for OGT Energy (the Client) within PL 1158, located 68 km southeast of Surat, southern inland Queensland. The 'Survey Area' comprised client-nominated areas including the buffered Disturbance Footprint around two gas well leases, flowlines, pond, camp and other infrastructure including an access track. Field ecology surveys were conducted by Boobook staff on the 8th of July 2025.

Field assessment included ground-truthed identification and mapping of potential Threatened Ecological Communities (TEC), remnant and mature regrowth Regional Ecosystems (RE), Environmentally Sensitive Areas (ESA) and potential habitat for threatened species.

The landscape within the Survey Area is extensively cleared for grazing purposes and existing gas infrastructure, however isolated patches and corridors of vegetation are present.

No state regulated vegetation is mapped within the Survey Area.

Ground-truthed regional ecosystems (GTRE) within the Survey Area included the following remnant and regrowth RE:

- Endangered (biodiversity status):
  - 11.4.7: *Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains.
  - 11.4.3: *Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains.
- Of Concern (biodiversity status):
  - 11.7.1: *Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust.

No Threatened Ecological Communities (TEC) were identified within the Survey Area.

Desktop searches suggested the potential presence of one threatened flora species listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Nature Conservation Act 1992* (NC Act), this being Ooline (*Cadellia pentastylis*). All were assessed as unlikely to occur within the Survey Area. No EPBC Act or NC Act-listed threatened flora species were found within the Survey Area. One flora species scheduled as Special Least Concern under the NC Act was detected within the Survey Area this being Kurrajong (*Brachychiton populneus).*

The following Weeds of National Significance (WoNS) and/or *Biosecurity Act 2014* restricted invasive plants were detected within the Survey Area:

- Common Pest Pear (*Opuntia stricta*) – WoNS; Biosecurity Act Category 3 Restricted matter.
- Velvety Tree Pear (*O. tomentosa*) – WoNS; Biosecurity Act Category 3 Restricted matter.

Desktop searches indicated the potential presence of multiple EPBC Act-listed and/or NC Act-listed threatened fauna species. No threatened fauna species were detected during field surveys within the Survey Area; however, no comprehensive fauna surveys were performed under this Scope of Works. Fauna surveys were limited to incidental observations and active searches at habitat assessment sites.

The following EPBC Act and/or NC Act-listed threatened fauna were assessed as likely to occur or having potential to occur within the Survey Area:

- Glossy Black-Cockatoo - eastern (*Calyptorhynchus lathami lathami*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
- White-throated Needletail (*Hirundapus caudacutus*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
- Koala (*Phascolarctos cinereus*) – EPBC Act: Endangered; NC Act: Endangered.
- Yakka Skink (*Egernia rugosa*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
- Woma (*Aspidites ramsayi*) – NC Act: Near Threatened.

Mapped predictive habitat for these species occurs within the Survey Area but not within the Disturbance Footprint.

Multiple EPBC Act-listed Migratory and/or Marine species were identified as potentially occurring within the Survey Area based on desktop searches and field surveys. No EPBC Act-listed migratory or marine fauna were recorded within the Survey Area.

One terrestrial fauna species listed as Special Least Concern under the NC Act was assessed as likely to occur within the Survey Area this being Short-beaked Echidna (*Tachyglossus aculeatus*).

Faunal habitat features and potential fauna breeding and/or shelter sites such as logs, hollow-bearing trees, stags, nests, and termitaria are present within the Survey Area, but were almost absent from the Disturbance Footprint.

No lakes, springs, Wetlands of General Ecological Significance or High Ecological Significance or other wetlands were mapped within the Survey Area. No wetlands, lakes or springs were ground-truthed as present within the Survey Area. No mapped streams were present within the Survey Area. No internationally or nationally significant wetlands were present within the Survey Area.

Two ESAs were identified within the Survey Area; however, none are within the Disturbance Footprint:

- Category B: Endangered Regional Ecosystems – regrowth and remnant (biodiversity status).
- Category C: Of Concern Regional Ecosystems – remnant (biodiversity status).

The proposed development will not result in the disturbance of any remnant or regrowth RE. No TEC threatened flora or their habitat, or springs/wetlands will be impacted by the Project. No significant residual impacts of the proposed works are expected on threatened fauna potentially present within the Survey Area.

Contents

List of Abbreviations and Definitions

Abbreviation	Definition
ALA	Atlas of Living Australia
Biosecurity Act	*Biosecurity Act 2014* (State)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DETSI	Department of Environment, Tourism, Science and Innovation (State)
Disturbance Footprint	Defined as the actual disturbance footprint associated with proposed infrastructure including well leases, pipelines, access tracks and other workspaces.
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
EP Act	*Environmental Protection Act 1994* (State)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESA	Environmentally Sensitive Area/s
Fisheries Act	*Fisheries Act 1994* (State)
GIS	Geographic Information System
GTRE	ground-truthed regional ecosystem
km	kilometre (s)
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992* (State)
NCAP	No Concern at Present
OGT	OGT Energy Pty. Ltd.
PMST	Protected Matters Search Tool
Qld	Queensland
RE	Regional Ecosystem (s)
REDD	Regional Ecosystem Description Database
SLC	Special Least Concern
SPRAT	Species Profile and Threats Database
SRI	Significant Residual Impact
TEC	Threatened Ecological Community/ies
Survey Area	Defined as the entire Survey Area which includes the disturbance footprint and associated assessment buffers on Lot 5 on Plan SP 233453and nominated parts of Penfolds Road
VMA	*Vegetation Management Act 1999* (State)
Water Act	*Water Act 2000* (State)
WoNS	Weed of National Significance

Disclaimer

The conclusions drawn in this report are based on available information at the time of writing. Any additional information may alter such conclusions and the author reserves the right to do so if such information becomes available. This report has been made as at the date of the report and is not to be used after six (6) months and not if there are any material changes meanwhile. In either event it should be referred back for review. To the extent permitted by law Boobook does not accept liability for any loss or damage which any person may suffer arising from any negligence or breach of contract on its part. This report was prepared for the benefit of the party to whom it is directed only and for the purpose identified within. Boobook does not accept responsibility to any other person for the contents of the report.

1 Introduction

1.1 Purpose and Scope

This report presents results from an ecological assessment undertaken for OGT Energy (OGT) (the Client) as part of gas extraction activities proposed within PL 1158, located approximately 68 km southeast of Surat, southern inland Queensland. The Survey Area was identified in maps and associated spatial data supplied by OGT and comprised the buffered footprint around two gas well leases, flowlines, pond, camp and other infrastructure including an access track (the Project). The Survey Area and proposed Disturbance Footprint is shown in Appendix A.

The purpose of this report is to provide a description of potential ecological values and constraints within the Survey Area. Results presented here are based on desktop assessments combined with field surveys to confirm vegetation communities, flora and fauna species and habitat values present within the Survey Area.

Boobook was requested to undertake the following assessments for Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) within the Survey Area:

- Identification and mapping of Threatened Ecological Communities (TEC) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Identification and mapping of remnant and mature regrowth regional ecosystems (RE) i.e. ground-truthed Regional Ecosystem (GTRE) mapping.
- Undertake a BioCondition assessment within each RE where vegetation will be significantly disturbed.
- Searches for the presence of EPBC Act and/or NC Act-listed threatened flora.
- Incidental observations of EPBC Act and/or NC Act-listed threatened fauna.
- Verification of any watercourse/ordered drainage, rivers, springs and wetlands.
- Record the location and abundance of non-native plants constituting Weeds of National Significance (WoNS) and/or Restricted Matter scheduled under the *Biosecurity Act 2014* (Biosecurity Act).
- Identify and provide predictive habitat mapping for EPBC Act and *Nature Conservation Act 1992* (NC Act) listed flora and fauna species potentially present within the Survey Area.
- Identify other potential constraints relating to MNES and MSES features within the Survey Area, including significant habitat values, breeding places as defined by the NC Act, and Environmentally Sensitive Areas (ESA) under the *Environmental Protection Act 1994* (EP Act) within or adjacent to the Disturbance Footprint; and
- Assess potential significant impacts on MNES and MSES features including vegetation and predicted habitat for EPBC Act and NC Act-listed species.

1.2 Survey Team

Field surveys of the Survey Area were conducted by Craig Eddie (Boobook, Principal Ecologist) and Weston Campbell (Boobook, Field Technician) on 8th of July 2025.

1.3 Site Description

1.3.1 Location

The Survey Area was situated within the following land parcel:

- Wagganba – Lot 5 on Plan SP 233453.

The Survey Area is located approximately 68 km southeast of Surat, southern inland Queensland. It was accessed via Surat Developmental Road, Teelba Road and Penfolds Road. The Survey Area is entirely within the boundary of Maranoa Regional Council. The Survey Area is within PL 1158.

1.3.2 Bioregion and Subregion

The Survey Area is situated within Subregion 29 (Weribone High) of the Brigalow Belt bioregion (Sattler and Williams 1999). The subregion is characterised by Belah (*Casuarina cristata*), Brigalow (*Acacia harpophylla*) and Poplar Box (*Eucalyptus populnea*) forests and woodlands on clay plains and Narrow-leaved Ironbark (*E. crebra*) and Bendee (*A. catenulata*) communities on ridges and residuals (Sattler and Williams 1999).

1.3.3 Geology, Topography and Soils

The landscape within the Survey Area is characterised by plains and low ridges on the Griman Creek Formation (DNRMMRRD 2025a). Soils include earths, texture contrast soils and reddish-brown light clays. Elevation within the Survey Area ranges from approximately 255 m in the west to 283 m in the east.

1.3.4 Land Zones

Preclear land zone mapping (DETSI 2024a) indicates that the Survey Area contains at least three land zones as defined by Wilson and Taylor (2012) these being land zone 4 (Tertiary-early Quaternary clay plains), land zone 5 (Cainozoic sand deposits) and land zone 7 (Cainozoic duricrusts).

1.3.5 Vegetation

Although the majority of the Survey Area is cleared for agricultural use, isolated patches of vegetation dominated by Poplar Box (*Eucalyptus populnea*), Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*) were present. A narrow corridor of open woodland dominated by Poplar Box (*E. populnea)* and Belah is present west of the property access track entrance along Penfolds Road.

1.3.6 Watercourses and Streams

There are no mapped streams within the Survey Area.

1.3.7 Current Land Use

The landscape within the Survey Area is primarily used for livestock grazing with some existing petroleum infrastructure.

2 Methodology

2.1 Desktop Assessment

A desktop assessment was performed prior to the field survey which included interrogation of the following datasets:

- EPBC Act Protected Matters Search Tool (PMST) (DCCEEW 2025a);
- EPBC Act Species Profile and Threats (SPRAT) Database (DCCEEW 2025b);
- Atlas of Living Australia (ALA) fauna and flora records (ALA 2025);
- WildNet fauna and flora records (DETSI 2025a);
- WildNet species profiles (DETSI 2025b);
- Protected Plants Flora Survey Trigger Map (DETSI 2025c);
- Wetlands and Wetland Protection Areas mapped under the EP Act (DETSI 2025d) and other Queensland Wetland mapping (DETSI 2025e);
- Environmentally sensitive areas (ESA) under the under the *Environmental Protection Act 1994* (DETSI 2025f);
- MSES (DETSI 2025g) and terrestrial biodiversity and aquatic conservation values environmental reports (DETSI 2025h);
- Remnant RE – biodiversity status (DETSI 2024b);

- Mature Regrowth mapping (DETSI 2024c);
- Geology mapping (DNRMMRRD 2025a);
- Essential Habitat mapping (DES 2023, DNRMMRRD 2025b);
- Regulated vegetation mapping (DNRMMRRD 2025c);
- Watercourse mapping (DNRMMRRD 2025d); and
- Queensland Globe and Google Earth imagery.

Searches were conducted of online spatial layers with lot/plan details as a spatial reference or the coordinates (datum WGS84), corresponding to the approximate centroid of the Survey Area being -27.663098, 149.462168, with a 10 km buffer. These datasets provided a baseline for subsequent field assessment.

2.2 Field Survey

The field ecological survey was conducted via foot and driven traverses of the Survey Area. Location and other data for all notable features encountered were recorded using a Zebra XPAD L10 tablet device, a hand-held global positioning system (GPS) unit, Apple iPhone mobile devices with inbuilt GPS and written notes.

In-field verification of desktop findings and additional findings of significance were undertaken in general accordance with the following:

- *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 7.0. (Neldner *et al.* 2023).

Formal survey sites were established in each assessment unit (AU), based on identifiable vegetation characteristics i.e. structure, floristics and condition. In general, at each site tertiary vegetation assessment and/or a more detailed BioCondition survey were conducted concurrently with fauna habitat assessment. Methodologies that were employed for each element of the field survey are further described in the following sections.

2.2.1 RE and TEC Assessment

RE and TEC assessment was informed by desktop review and by ground-truthing during field assessment. Ground-truthing (and confidence level scoring) of the RE designation was undertaken using the tertiary level of data collection derived from Neldner *et al*. (2023). Assessments were undertaken within 50 m x 20 m plots for the purpose of typifying the vegetation community under assessment. Plots were chosen within representative areas of each vegetation type encountered. Data collected in these assessments include photos facing in each cardinal direction from the plot centre, a brief site description and comments on disturbance, estimated non-native vegetation cover, recruitment to the ecologically dominant layer (present/absent), along with estimated layer height (median and range) and a list of dominant and other notable species, including weeds, for each layer identified within the vegetation community.

Vegetation community polygons were verified in accordance with Queensland RE description and biodiversity status as per the Regional Ecosystem Description Database (REDD) (DETSI 2025i) and classified as remnant RE, vegetation consistent with RE (regrowth) or non-remnant vegetation as per the following definitions:

- Remnant vegetation was that which had achieved a canopy layer covering more than 50% of that of the undisturbed canopy and a height more than 70% of the undisturbed height of the vegetation.
- Mature regrowth was vegetation floristically equivalent to a RE but not meeting structural thresholds of remnant RE – typically this is greater than 15 years old and may contain some multiple shrub layers, canopy species and some fauna habitat features e.g. woody debris.
- Immature regrowth was vegetation containing some elements of an RE but does not have ecosystem functionality; typically this regrowth is less than 15 years old, canopy species are absent or infrequent, regrowth is dominated by shrubs and few fauna habitat features are generally present.

Vegetation community data was captured in the field and entered into client-specific data fields within spatial databases via Global Position System (GPS) enabled Zebra tablet devices. Representative photographs were taken using a digital camera as supporting evidence of the subject vegetation community. Capture and delineation of RE and TEC boundaries was undertaken using a

combination of mobile Geographic Information System (GIS) devices, GPS and/or delineation from imagery. A minimum mappable size of 0.5 ha and minimum mappable width of 30 m for linear vegetation corridors was applied.

For each area of potential TEC an assessment of vegetation survey data was made against TEC threshold criteria (e.g. DCCEEW 2025a, TSSC 2009, TSSC 2010, TSSC 2013a, TSSC 2019a).

2.2.2 BioCondition Survey

Any BioCondition assessments were undertaken as per the methodologies described by Eyre *et al*. (2011, 2015). This involved the establishment of a 100 m x 50 m transect containing five assessment areas (plots/quadrats) to record values for defined ecological attributes. These values were used as indicators to provide a quantitative measure for the performance of ecosystem function within the context of biodiversity conditions.

The following information was recorded at each BioCondition site:

- Date;
- Observers;
- Description of location (bioregion, general description, co-ordinates for plot origin and centre, plot bearing and alignment);
- General habitat description and RE type;
- Median height for canopy, emergent and sub-canopy strata;
- Slope position/slope degree and slope aspect;
- Tree species richness (within 100 m x 50 m plot);
- Native plant species richness (within 50 m x 10 m plot);
- Non-native plant cover (within 50 m x 10 m plot);
- Total length of coarse woody debris (length >10 cm diameter and >0.5 m long within 50 m x 20 m plot);
- Number and average diameter at breast height (DBH) of large eucalypt and non-eucalypt trees (within 100 m x 50 m plot);
- Recruitment of canopy species (within the 100 m x 50 m plot);
- Tree and shrub canopy cover (within 100 m transect);
- Ground cover within 1 m x 1 m plots (native perennial grass and organic litter cover in the ground layer);
- Disturbances (severity, last event and observation type).

Large tree DBH thresholds for each RE were used where benchmark documents were available (DETSI 2025j), otherwise the default ≥30 cm DBH for eucalypts and ≥20 cm DBH for non-eucalypts was applied.

Site photographs were taken using a digital camera in accordance with Eyre *et al*. (2011, 2015) (i.e. one photograph at plot origin and north, east, south and west photographs at the plot centre). Photograph numbers were recorded. Locations of BioCondition sites were determined using a handheld Global Positioning System (GPS) (Garmin GPSmap 78S) and BioCondition assessment data was captured by mobile GIS devices (Zebra XPAD L10 tablet device).

Due to current and proposed land use (grazing and/or coal seam gas development) of the BioCondition site locations, permanent 0 m and 50 m markers were not established using steel fence posts as described in the methodology Eyre *et al*. (2015) and Eyre *et al*. (2011).

Scores for BioCondition sites were calculated in accordance with Eyre *et al*. (2015) which compares the values obtained at each survey site with values in the benchmark document for that particular RE (DETSI 2025k). Where RE lacked a published benchmark (DETSI 2025k) these were generated from the median value of high-quality reference sites within the Boobook BioCondition database (including sites from across the southern Brigalow Belt). The resultant site scores were then combined with landscape context scores and divided by the maximum possible score for that RE. This provides an index of biodiversity condition, where scores closer to 0 indicates that sites are 'dysfunctional' and those closer to 1 indicates that sites have 'functional' condition.

2.2.3 Threatened, SLC and Pest Flora Survey

Targeted surveys for EPBC and/or NC Act-listed threatened flora were informed by the desktop search results and local experience. Searches for threatened flora were carried out throughout the Survey Area at vegetation assessment sites and during vehicle traverses and random meanders throughout the Survey Area.

Where detected, counts and extent of each population of threatened flora were made as well as structural characteristics and representative photographs taken.

Significant weed species, these being WoNS and Biosecurity Act Restricted Matter, were recorded as representative examples to indicate the presence and abundance of the species within the Survey Area.

Representative examples of SLC flora were recorded throughout the Survey Area.

2.2.4 Threatened, SLC and Pest Fauna Survey

No comprehensive fauna surveys, using trapping or acoustic techniques, were undertaken under this Scope of Works. Incidental records of threatened, pest and SLC fauna obtained while walking and/or driving during the field survey were fully documented including species name, location (with site co-ordinates or area of extent), habitat and number detected. There were no systematic surveys to identify all fauna species present within the Survey Area.

2.2.5 Fauna Habitat Assessment

Microhabitat assessments were conducted at representative sites within each ground-truthed RE present within the Survey Area.

Data was collected for fauna habitat features to inform the likelihood of occurrence assessments for threatened fauna. These data were collected within 50 m x 20 m plots used for vegetation assessments. Features were assessed semi-quantitatively and included the presence and abundance of:

- hollow-bearing live trees, stags and logs;
- decorticating trees and logs;
- logs by size class;
- leaf and woody litter stone/rock and grassy ground cover;
- rock outcrops, gilgais, termite mounds and burrows; and
- mistletoe and other potential food plants.

2.2.6 Threatened Species Habitat Mapping

The results of microhabitat assessments, combined with published information and ecologist knowledge of fauna distribution and habitat use, were used to predict habitat suitability for EPBC Act and NC Act-listed threatened fauna species. These results were used to develop GIS-based mapping of potential habitat for threatened species assessed as potentially occurring within the Survey Area.

2.2.7 Fauna Habitat Features

Representative active or potential fauna breeding and/or shelter places were recorded where found. Such places included:

- hollow-bearing logs, other large logs and log piles;
- live/dead trees and stags with hollows;
- live trees with other habitat value (e.g. potential food trees for threatened fauna)
- nests;
- aerial and/or terrestrial termite mounds;
- gilgais;
- ephemeral waterholes;
- rock outcrops;

- caves;
- piles of flood debris; and
- decorticating trees and logs.

2.2.8 Wetlands and Streams

Any mapped ordered streams within the Survey Area were assessed at representative survey locations to determine if these mapped features were watercourses or drainage features as defined by the *Water Act 2000*. Ordered stream assessments included assessment of the presence/absence of a defined channel with bed and banks, riparian vegetation, evidence of extended flow and hydrophytes. Bank height and slope, and bed widths, were also recorded where these features were present.

Where potential wetlands (including springs) were encountered they were assessed against the hydrological and biotic criteria of the Queensland Wetland Program wetland definition (DERM 2011).

2.3 Nomenclature

Flora species names used in this report follow Queensland Herbarium (2025) and vertebrate fauna taxonomy and nomenclature follows the Queensland WildNet database (DETSI 2025a).

2.4 Survey Conditions and Limitations

Approximately 259 mm of rainfall was recorded at the nearest official weather station (Teelba TM 043097), 12.8 km south-southwest of the Survey Area, between January and June 2025 (BOM 2025). Plant growth across the entire Survey Area was extensive; however, ground layer plants may have been subject to recent frosts. Survey conditions were otherwise highly suitable for the ecological assessment.

3 Results and Discussion

3.1 Matters of National Environmental Significance

3.1.1 Threatened Ecological Communities (TEC)

PMST search results (DCCEEW 2025a) indicated the potential presence of four TEC within the Survey Area these being:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions;
- Poplar Box Grassy Woodland on Alluvial Plains; and
- Weeping Myall Woodlands.

No TECs were identified within the Survey Area (Appendix B). RE 11.4.3 is a component RE of the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. However, occurrences of this RE (as high value regrowth) within the Survey Area did not meet condition thresholds (TSSC 2013) in that exotic perennial plants comprise more than 50% of the total vegetation cover of the patch.

Likewise, RE 11.4.7 is a component RE of the Poplar Box Grassy Woodland on Alluvial Plains TEC (TSSC 2019a). However, occurrences of this RE within the Survey Area did not meet listing criteria for the TEC as Poplar Box (*Eucalyptus populnea*) was not dominant in the canopy (i.e. Poplar Box and Belah *Casuarina cristata* were co-dominant, and the patch was shrubby rather than grassy).

3.1.2 Threatened Flora

3.1.2.1 Likelihood of Occurrence Assessment

PMST search results (DCCEEW 2025a) indicated the potential occurrence of six EPBC Act-listed threatened flora species within the desktop search area. Other search results (ALA 2025, DETSI 2025a) produced records of an EPBC Act-listed threatened flora species within the desktop search area, this being Ooline (*Cadellia pentastylis*).

A likelihood of occurrence assessment of EPBC Act-listed threatened flora is provided in Table 1.

Table 1: Assessment of likelihood of occurrence for EPBC Act-listed threatened flora within the Survey Area

Key to Status: E = Endangered; V = Vulnerable; NT = Near Threatened; C = Least Concern.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Apocynaceae	*Vincetoxicum forsteri* (as *Tylophora linearis*) Slender Tylophora	E	E	A cryptic twining vine, occurring in dry woodland along the western slopes of the Great Dividing Range, from Temora in southern NSW north to around Miles in southern Queensland (ALA 2025, DCCEEW 2025b, Boobook unpubl. data). The species is associated with shrubby woodland dominated by Ironbarks (*Eucalyptus crebra*, *E. fibrosa* or *E. sideroxylon*), Grey Box (*E. microcarpa*, *E. woollsiana*) or White Cypress Pine (*Callitris glaucophylla*) with a subcanopy of *Acacia* spp., *Melaleuca* spp., *Callitris* spp. and/or Bull Oak (*Allocasuarina luehmannii*) (Forster *et al.* 2004). These habitats occur on low fertility soils found on sandy plains, ironstone jump-ups and metamorphic substrates (land zones 5, 7 and 11). Aerial twines grow from a perennial rootstock after summer rains and wither in dry periods (Forster *et al.* 2004), during which the species may not be detectable.	**Unlikely to be present.** The closest known occurrence is from Myall Park near Glenmorgan, approximately 55 km north-northeast of the Survey Area. Habitat within the Survey Area is fragmented and unlikely to support this species.
Brassicaceae	*Lepidium monoplocoides* Winged Pepper-cress	E	C	A small forb occurring on semi-arid inland plains of the Murray-Darling Basin. It occurs in open, sparsely vegetated areas on heavy clay soils that are seasonally flooded (Mavromihalis 2010). This ephemeral species is found in floodplain woodlands dominated by Coolibah (*Eucalyptus coolabah*) and/or Black Box (*E. largiflorens*) as well as chenopod shrublands and halophytic wetlands. The species has a wide historic distribution through inland NSW and Victoria. The sole records from Queensland are from an area of natural saline scalds around Yelarbon, near the state border with NSW (ALA 2025). The Yelarbon population was recently described as a distinct species (Al-Shebaz 2023).	**Unlikely to be present.** The Survey Area is outside the known range of this species, being over 150 km northwest of the closest records around Yelarbon.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Euphorbiaceae	*Bertya opponens* Coolabah Bertya, Broad-leaved Bertya	V	C	Occurs in widely scattered localities from near Cobar and the Pilliga region of inland NSW to Charleville and White Mountains National Park in Queensland and extending to drier subcoastal ranges (ALA 2025, DCCEEW 2025b). The species has been recorded growing in mixed shrubland, mallee woodland, Eucalypt/*Acacia*/*Callitris* woodland with a shrubby understorey and on the fringes of semi-evergreen vine thicket (SEVT). It occurs on shallow, rocky, sandy loams and red earths associated with sandstone outcrops (DCCEEW 2025b, DETSI 2025b).	**Unlikely to be present.** No suitable woodlands occur within the Survey Area. The closest known occurrence is from approximately 10 km west-northwest of the Survey Area.
Fabaceae	*Swainsona murrayana* Slender Darling-Pea	V	V	A narrow-leaved herbaceous legume growing in heavy clay soils, often in depressions on floodplains, occurring on grey and red to brown clay and clay-loam soils in *Atriplex vesicaria* herbfield, *Eucalyptus largiflorens* woodland and grassland communities where it is frequently associated with *Maireana* spp. (TSSC 2008a). This species is widespread across the southern inland Murray-Darling basin but is only known in Queensland from five specimens; one collected south of Surat in Brigalow Belt subregion 29 (Weribone High); and four from the channel country of central western Queensland between Boulia, Birdsville and Longreach (ALA 2025).	**Unlikely to be present** The Survey Area is outside the known range of this species, being over 67 km east-southeast of the closest records near Surat.
Poaceae	*Dichanthium setosum* A Bluegrass	V	C	Occurs on basalt tablelands from southern NSW to Toowoomba in Queensland with disjunct populations further north in the central highlands, Einasleigh uplands and north-western highlands (ALA 2025; TSSC 2008b). Found in eucalypt or Brigalow woodland on black clays and hard-setting red-brown loams (DETSI 2025b; TSSC 2008b). Occurs in some moderately disturbed areas such grassy roadside remnants and areas cleared for grazing (TSSC 2008b).	**Unlikely to be present.** There is no suitable habitat within the Survey Area (i.e. basalt derived heavy clay soils). The closest known occurrence is approximately 250 km east of the Survey Area.
Surianaceae	*Cadellia pentastylis* Ooline	V	V	A tree, with a patchy occurrence throughout the Southern Brigalow Belt from northern NSW to Central Queensland (TSSC 2008c). It occurs patchily from around Gunnedah in NSW north to Blackall and Duaringa in Queensland (ALA 2025). Occurs on undulating plains, hillsides and scarps, often in association with Brigalow and SEVT communities (TSSC 2008c, Santos 2012). Large stands occur in Carnarvon National Park, on ridges around Mungallala and Morven, below scarps along the Great Dividing Range near Wandoan, around Taroom and in the Arcadia Valley.	**Unlikely to be present.** Potentially suitable woodland habitat on land zone 7 is present within the Survey Area; however, the species is readily detectable and was not present within the Survey Area. The nearest record is approximately 6 km north-northwest of the Survey Area (DETSI 2025a, ALA 2025).

3.1.2.2 Field Survey Results

No species of EPBC Act-listed threatened flora were detected within the Survey Area.

3.1.3 Weeds of National Significance (WoNS)

Desktop searches of public databases (ALA 2025, DETSI 2025a) revealed no records of WoNS within the desktop search area. Two species of WoNS were detected within the Survey Area during field surveys. These species are listed in Table 2. Both Velvety Tree Pear (*Opuntia tomentosa*) and Common Pest Pear (*O. stricta*) occurred at low to moderate densities throughout the Survey Area. Representative locations of these species within the Survey Area are shown within Appendix C. Representative images of WoNS are shown in Section 8 (Figures 1a-b).

Table 2: WoNS and Biosecurity Act invasive plants recorded within the desktop search area and the Survey Area

Family	Scientific Name	Common Name	WoNS / Biosecurity Act Status	Comments
Cactaceae	*Opuntia stricta*	Common Pest Pear	WoNS, Cat. 3 Restricted Matter	Multiple occurrences within the Survey Area. Occurs throughout the Survey Area at low to moderate densities.
Cactaceae	*Opuntia tomentosa*	Velvety Tree Pear	WoNS, Cat. 3 Restricted Matter	Multiple occurrences within the Survey Area. Occurs throughout the Survey Area at low to moderate densities.

3.1.4 Threatened Fauna

3.1.4.1 Likelihood of Occurrence Assessment

The PMST search (DCCEEW 2025a) indicated the potential occurrence of 23 EPBC Act-listed threatened fauna species within the buffered desktop search area. Desktop searches of public databases (DETSI 2025a, ALA 2025) contained no records of EPBC Act-listed threatened fauna species within the buffered desktop search area. A likelihood of occurrence assessment for EPBC Act-listed threatened fauna as per the PMST search (DCCEEW 2025a) is presented in Table 3.

Table 3: Assessment of likelihood of occurrence assessment for EPBC Act-listed threatened fauna within the Survey Area

Key to Status: CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; C = Least Concern.

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Potentially Suitable RE	Likelihood of Occurrence
Birds	*Aphelocephala leucopsis* Southern Whiteface	V	V	A sedentary or locally nomadic species occurring in sparsely treed open woodlands and shrublands across southern inland Australia (TSSC 2023a). Often observed in semi-arid *Acacia* low open woodland, particularly Mulga (*Acacia aneura*), and chenopod shrublands (Higgins *et al.* 2001). In Queensland the species is largely restricted to southern border areas in the Mulga Lands, Channel Country, Nandewar and Darling Riverine Plains Bioregions (ALA 2025). Sporadic reports from elsewhere in the southern Brigalow Belt probably reflect vagrancy at the edge of the species range (Higgins *et al.* 2001). The specific habitat needs of this species and causes of population declines over recent decades are not understood (Ehmke *et al.* 2021).	N/A	**Unlikely to be present.** The closest confirmed records are over 40 km north-northwest of the Survey Area (DETSI 2025a, ALA 2025). Scattered sighting records in the Glenmorgan-Teelba area probably represent transient/vagrant individuals. Habitat within the Survey Area is highly disturbed, very small and severely fragmented, and is therefore unlikely to support this species.

Birds	*Botaurus poiciloptilus* Australasian Bittern	E	E	A large, cryptic heron species that inhabits reed beds or other tall dense vegetation in freshwater and brackish wetlands (Herring *et al.* 2021). Its distribution extends across southeastern Australia, from south-east Queensland through to Adelaide, and also in south-western Australia, Tasmania and New Zealand (TSSC 2019b). In Queensland it has been recorded in coastal wetlands south from Byfield and inland through the Murray-Darling Basin (ALA 2025; TSSC 2019b). Recent surveys suggest that 95% of the Australian population breeds in the Riverina district of NSW (Herring *et al.* 2021). The Queensland population, estimated in 2010 as 3-16 birds, may now be restricted to coastal wetlands (Herring *et al.* 2021; TSSC 2019b). The species is mobile and capable of long-distance movements with occasional vagrants encountered far beyond the breeding range (ALA 2025; TSSC 2019b).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Calidris acuminata* Sharp-tailed Sandpiper	V	V	A non-breeding migratory wader species occurring on coastal and inland wetlands (Clemens *et al*. 2021a). Population monitoring within Australia suggests that this species has declined by around 45% over the past two decades (Clemens *et al.* 2021a). Individuals and flocks are regularly recorded across inland Queensland, especially in October and April during migration (ALA 2025; Birdlife Australia 2025; eBird 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Calidris ferruginea* Curlew Sandpiper	CE	CR	A non-breeding migratory wader species usually encountered on coastal and near-coastal saline and freshwater tidal and palustrine wetlands (Clemens *et al.* 2021b; DCCEEW 2025b). The Australian population has declined by > 50-80% over the past two decades (Clemens *et al.* 2021b). Passage migrants are occasionally present on inland wetlands, and the species is sparsely recorded across inland Queensland (ALA 2025; Birdlife Australia 2025; eBird 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Calyptorhynchus lathami lathami* Glossy Black-Cockatoo (Eastern/South-eastern subspecies)	V	V	This subspecies occurs in subcoastal ranges from eastern Victoria north to central Queensland with sparse occurrences inland to the Carnarvon Range and along rivers of the Murray-Darling Basin (ALA 2025; Cameron *et al.* 2021). The species is recorded periodically around Roma, Surat, Glenmorgan, Jackson, Condamine and Chinchilla (Boobook, unpubl.; ALA 2025). This is a specialised feeder dependent on the seeds of several species of *Allocasuarina* and *Casuarina*. It occurs in a variety of forest and woodland types where these food trees are present (Cameron *et al.* 2021; Menkhorst *et al.* 2020; Pizzey *et al.* 2012). It also uses isolated feed trees and small habitat patches within fragmented landscapes (Pavey *et al.* 2016; Holmes 2012). The species roves widely with some evidence of seasonal movements following maturation of she-oak fruits (Stock and Wild 2005; Hourigan 2012; Boobook unpubl. data). Breeding pairs nest in large hollows generally high up in large eucalypt trees or stags near water and food sources (Pavey *et al.* 2016; Higgins 1999).	11.4.7, 11.7.**1**	**Potentially present.** This species is uncommonly recorded in the region; however, transient individuals could occur intermittently. Food trees (Belah *Casuarina cristata*) are present within vegetation remnants (RE 11.4.7, 11.7.1).

Birds	*Climacteris picumnus victoriae* Brown Treecreeper (south-eastern)	V	V	This sedentary, cooperative breeding, insectivorous bird occurs broadly around the Great Dividing Range, from the Grampians of Victoria to the Bunya Mountains in Queensland (Ford *et al.* 2021; Menkhorst *et al.* 2020). Along the inland and northern side of this range is a broad intergradation zone with *C. p. picumnus*, which is not EPBC Act-listed (Ford *et al.* 2021; Menkhorst *et al.* 2020; TSSC 2023b). *C. p. victoriae* occurs in eucalypt dominated open forest and woodland, often in periodically inundated areas, where there are abundant tree hollows and hollow logs and high invertebrate biomass associated with woody debris and leaf litter (Ford *et al.* 2021). This species lives in pairs and small family groups, roosting and nesting in tree hollows and foraging on the ground and on trees (Bennett *et al.* 2012; TSSC 2023b). Older siblings contribute to predator vigilance and feeding young, resulting in breeding success increasing with group size (Doerr and Doerr 2007). The species has limited ability to disperse across pastoral lands, rarely crossing gaps larger than 100 m (Doerr *et al.* 2011), and dispersing individuals are vulnerable to predators (Bennet *et al.* 2012). The major threats to the species are habitat loss and fragmentation (Ford *et al.* 2021). It is also sensitive to habitat degradation from grazing pressure, weeds and insufficient or excessive fire, resulting in increased exposure to predation and harassment by Noisy Miners (*Manorina melanocephala*), particularly in small woodland fragments (Bennett *et al.* 2012; TSSC 2023b; Ford *et al.* 2021).	N/A	**Unlikely to be present.** Habitat within the Survey Area is highly disturbed, very small and severely fragmented, and is therefore unlikely to support this species.
Birds	*Erythrotriorchis radiatus* Red Goshawk	E	E	A sparsely distributed raptorial bird that is now restricted to tropical Australia (MacColl *et al.* 2021). The species inhabits extensively wooded landscapes with permanent water sources (Czechura *et al.* 2010). This highly mobile bird has a large home range and is capable of long-distance dispersal (MacColl *et al.* 2021). It roosts and nests in tall forest along major drainage lines, especially around waterholes, where there is high avian prey diversity. Foraging birds could potentially disperse far from these areas (Marchant and Higgins 1993). Red Goshawk is sensitive to landscape level clearing and has declined to extinction in southern and central Queensland (DERM 2012, Seaton 2014). The Brigalow Belt Bioregion is now considered to be outside the species extent of occurrence (MacColl *et al.* 2021).	N/A	**Unlikely to be present.** The Survey Area is marginally within the historical range of this species; however, Red Goshawk is now considered extinct throughout southern and central Queensland (MacColl *et al.* 2021).

Birds	*Falco hypoleucos* Grey Falcon	V	V	A rarely seen species, occurring at low densities throughout the arid and semi-arid interior of Australia (TSSC 2020, Schoenjahn *et al.* 2020). In Queensland the species is largely restricted to the southwestern Mulga Lands and Channel Country Bioregions. This is a pursuit predator that feeds almost exclusively on birds, which it hunts on open woodland plains and around water sources (Schoenjahn *et al.* 2022). The species nests in large trees along streamlines (TSSC 2020). The species is partially nomadic and itinerant individuals are occasionally recorded in more mesic areas such as the Brigalow Belt (ALA 2025).	N/A	**Unlikely to be present.** The Survey Area is far (>500 km) from the preferred habitat of this species, *Acacia* shrubland plains traversed by tree-lined watercourses in the southwest of the State (TSSC 2020). Occurrence in this region would only involve transient individuals.
Birds	*Gallinago hardwickii* Latham's Snipe, Japanese Snipe	V	V	A spring-summer migrant to Australia from breeding grounds on islands and mainland north-eastern Asia (Hansen *et al.* 2021). Declines of 30-50% in the Japanese breeding population, over the past decade, are attributed to drought and habitat change in Australia. The species follows a migration pathway through New Guinea to north-eastern Queensland, dispersing throughout eastern Australia as far as Tasmania (Hansen *et al.* 2021). This cryptic species favours wet pastures and boggy margins of vegetated wetlands (Pizzey *et al.* 2012) including artificial and ephemeral swamps, close to inundated areas (Hansen *et al.* 2021). Individuals and small groups are regularly reported from inland southern and central Queensland, particularly after rainy periods.	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.

Birds	*Geophaps scripta scripta* Squatter Pigeon (southern subspecies)	V	V	This is a ground-feeding, ground-nesting pigeon occurring in Queensland from Texas, on the NSW border, through to Cape York. The southern subspecies has undergone long-standing decline, becoming extinct in NSW and rare in southern Queensland (Ward *et al.* 2021). The species inhabits woodland with a low, open ground layer, usually within a few kilometres of a water source (Higgins and Davies 1996). It feeds on seeds of legumes, forbs and some grasses (Higgins and Davies 1996, Ward *et al.* 2021). The species is largely terrestrial, preferring to crouch and freeze when disturbed, although birds will fly to safety on closer approach and birds roost in trees at night (Higgins and Davies 1996). Ongoing declines, particularly in the south of the range, have been attributed to intensive grazing, land clearing, predation by foxes and cats, and encroachment of foraging habitat by introduced pastoral grasses, especially Buffel Grass (*Cenchrus ciliaris*) (Ward *et al.* 2021). Squatter Pigeon occurs in small, sedentary flocks and is readily detected as it preferentially forages in sparsely vegetated areas, including disturbed sites along roads, dams and stockyards. The species is regularly encountered in the upper Dawson catchment but appears to be near extinct in the heavily cleared landscape south of Roma and Miles (Boobook unpubl. data). Occasional sight records from the past two decades suggest the possibility of a small remnant population in forested areas around the Balonne River (ALA 2025, Birdlife Australia 2025). However, sightings require validation as Common Bronzewing (*Phaps chalcoptera*), a pigeon of similar size and markings may be confused with Squatter Pigeon.	N/A	**Unlikely to be present.** The Survey Area is within the historical distribution of the subspecies; however, there are no confirmed recent (<20 years) records of this species in or near the Survey Area.
Birds	*Grantiella picta* Painted Honeyeater	V	V	An enigmatic, rarely encountered and dispersive species found in woodlands of inland eastern Australia, following fruiting of Amyema mistletoe food plants, on which it is dependent (Higgins *et al.* 2001, Watson 2012). Breeding in Box-Ironbark, Brigalow, Belah and Weeping Myall woodlands with abundant mistletoe, on the western slopes of the Great Dividing Range, from the Grampians in western Victoria north to around Chinchilla in Queensland (Watson *et al.* 2021). Dispersed records from further northwest in Queensland and the Northern Territory represent seasonal and nomadic movements across the winter range (Watson *et al.* 2021, ALA 2025). Historical declines occurred in heavily cleared areas in the south of the breeding range (Higgins *et al.* 2001). However, recent analyses suggest that the species population is larger than previously thought with no significant decline in the past decade (Watson *et al.* 2021).	N/A	**Unlikely to be present.** Most of the Survey Area is devoid of trees which is therefore unsuitable for this species. Habitat assessments showed an absence of mistletoe within ground-truthed vegetation within the Survey Area.

Birds	*Hirundapus caudacutus* White-throated Needletail	V	V	An aerial insectivore present in eastern Australia as a spring/summer non-breeding migrant from Asia (Tarburton 2021). Occurs over most habitat types, including disturbed areas, but with a preference for foraging over wooded areas (Tarburton and Garnett 2021). Individuals roost on trunks and upper branches of tall trees at forest edges or trees on ridgelines, arriving and leaving roosts in the dark (Tarburton 2021). During cold conditions, birds may roost in tree hollows for a period of days, in a torpid state (Tarburton 2021). Migrating birds fly at high altitude and at night (Tarburton 2021). The species has few predators in Australia but predation of roosting birds by owls and, rarely, capture of birds in flight by Peregrine Falcon, have been recorded (Tarburton 2021). Ongoing declines appear largely due to loss of breeding sites (large trees with hollows) in northeast Asia (Tarburton and Garnett 2021). However, deaths from collision with wind turbines, in Australia and elsewhere, at night and in daylight, is an increasing threat for this bird (Tarburton 2021).	11.4.3, 11.4.7, 11.7.**1**	**Likely to be present.** May overfly any part of the Survey Area following spring-summer storm fronts.
Birds	*Lophochroa leadbeateri leadbeateri* Pink Cockatoo (eastern)	E	E	A bird of inland Australia including the Murray-Darling, Eyre and Bulloo River Basins, occurring in arid and semi-arid woodland and shrubland habitats (TSSC 2023c; Menkhorst *et al*. 2020). Commonly recorded in south-western Queensland but rarely encountered east of about Mitchell (ALA 2025; Birdlife Australia 2025). Often recorded in Mulga (*Acacia aneura*), Poplar Box (*Eucalyptus populnea*), Gidgee (*A. cambagei*), White Cypress Pine (*Callitris glaucophylla*), Belah (*Casuarina cristata*) and Coolibah (*E. coolabah*) woodland and open woodland. Nests during August/September in large hollows of old growth trees including eucalypts and cypress pine (TSSC 2023c, Hurley and Garnett 2021, Rowley and Chapman 1991) with preferred nesting habitat most likely to be found in intact remnant woodland. Breeding pairs have large home ranges (TSSC 2023c). Feeds on a variety of tree and shrub seeds as well as bulbs and insect larvae (Higgins 1999) often in or close to wooded areas (TSSC 2023c). In the Mulga Lands of Qld it is particularly fond of the seeds of pie melons (*Citrullus* spp.) (Boobook unpubl. data). Reporting rates for this species declined by over 50% in the past three generations (Hurley and Garnett 2021). This decline is likely due to loss of nesting trees from clearing and fire and historical failure of tree recruitment due to browsing by rabbits, goats, stock and inflated populations of kangaroos (Hurley and Garnett 2021).	N/A	**Unlikely to be present.** The Survey Area is east of the core distribution of this species; however, scattered records occur within 30-40 km. Habitat within the Survey Area is highly disturbed, very small and severely fragmented, and is therefore unlikely to support resident populations of this species.

Birds	*Neophema chrysostoma* Blue-winged Parrot	V	V	This small, migratory parrot occurs across a broad area of southeastern Australia but is absent from the eastern coast and ranges (Menkhorst *et al.* 2020). The species breeds in near-coastal woodland in Tasmania, Victoria and South Australia, with post-breeding dispersal inland as far north as southwestern Queensland (Holdsworth *et al.* 2021). The species is listed as Marine under the EPBC Act due to a proportion of the population that migrates seasonally across Bass Strait. This gregarious, ground-feeding species eats grass seeds and forbs in woodland, saltmarsh and around wetland areas (Holdsworth *et al.* 2021, Menkhorst *et al.* 2020, Higgins 1999). In Queensland the species is restricted to the Channel Country and Darling River Floodplain landforms, with a distributional limit extending along the NSW border south and west of Goondiwindi, generally south of the Balonne Highway around Cunnamulla and Thargomindah, and then north in the Coopers Creek and Diamantina drainages to Windorah and Bedourie (ALA 2025). There are no records from the Maranoa region and the species is unlikely to occur within this area. Recording rates for this species have declined significantly in the core breeding distribution in Tasmania and Victoria, suggesting population-wide decline (TSSC 2023d, Holdsworth *et al.* 2021).	N/A	**Unlikely to be present.** In Queensland this species is restricted to the Darling River floodplain and Channel Country. There are no records of this species from the vicinity of the Survey Area, the nearest reliable sightings being over 130 km to the south between Boomi and Garah in NSW (ALA 2025).
Birds	*Rostratula australis* Australian Painted Snipe	E	E	A secretive nomadic wader that forages and breeds in variably inundated wetlands with features such as complex shorelines, areas of shallow water, dense low vegetation and exposed wet mud (DEE 2019; Rogers *et al.* 2021). Uses both artificial and natural ephemeral and permanent wetlands (Marchant and Higgins 1993). Forages at shallow edges and adjacent vegetated margins of wetlands (DCCEEW 2025b) for seeds and invertebrates (Rogers *et al.* 2021). Recorded over much of Australia other than the driest interior, but most frequently recorded within the Murray-Darling Basin (ALA 2025). Partially migratory, with birds in south-eastern Australia moving in autumn-winter to coastal areas of central and northern Queensland, where it occurs year-round (Rogers *et al.* 2021). The species is unpredictable in occurrence and difficult to detect. Total numbers are estimated at below 2500 individuals (DEE 2019).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.

Birds	*Stagonopleura guttata* Diamond Firetail	V	V	An inobtrusive small ground-feeding finch that occurs in grassy woodlands and forests on tablelands and inland slopes of the Great Dividing Range across south-eastern Australia (Menkhorst *et al.* 2020). In Queensland the species range formerly extended throughout upland areas of the Brigalow Belt but is now largely confined to the New England Tableland Bioregion (ALA 2025; Hodder *et al.* 2021). Declines are attributed to woodland clearing and replacement of perennial indigenous grasses with introduced annual grasses (Hodder *et al.* 2021). Occasional recent records from the Expedition Range and Gurulmundi-Barakula areas may represent dispersing vagrants or small extant populations in rugged, forested uplands which are rarely surveyed (ALA 2025).	N/A	**Unlikely to be present.** Very occasional records from the southern Brigalow Belt Bioregion over the past two decades are confined to extensively forested areas (ALA 2025, Birdlife Australia 2025, eBird 2025). The nearest records to PL 1158 are approximately 28 km to the south near Ula Ula SF (ALA 2025). Habitat within the Survey Area is highly disturbed, very small and severely fragmented, and is therefore unlikely to support resident populations of this species.
Fish	*Bidyanus bidyanus* Silver Perch	E	E	A fish endemic to the Murray Darling Basin which is highly migratory and found in lowland, turbid rivers where it prefers faster-flowing water such as rapids/races and more open sections (TSSC 2013b, Lintermans 2007). The middle Murray River represents the current core habitat for the species following severe declines over many decades (TSSC 2013b, Lintermans 2007).	N/A	**Unlikely to be present.** No aquatic habitat is present within the Survey Area.
Mammals	*Nyctophilus corbeni* Eastern Long-eared Bat	V	V	This poorly known species has a patchy occurrence across the inland Murray-Darling Basin and southern Fitzroy Basin (Churchill 2008; Reardon 2012; ALA 2025). The species inhabits a variety of dry shrubby woodland and open forest types, particularly Box/Ironbark/Cypress Pine vegetation with a dense cluttered understory (Reardon 2012; TSSC 2015). Foraging individuals use temporary daytime roosts in tree hollows and crevices or under loose bark (Reardon 2012; TSSC 2015). Maternity colonies of up to 20 individuals roost in tree hollows, often in stags (TSSC 2015). Validated records of the species are known from sites in Expedition National Park, in the Carnarvon Ranges, Barakula State Forest and the Dawson River near Precipice National Park (ALA 2025).	N/A	**Unlikely to be present.** The Survey Area is within the broader distribution of the species. The closest records of the species are from Southwood NP about 60 km to the east-southeast. Habitat within the Survey Area is highly disturbed, very small, lacks suitable shelter sites and severely fragmented, and is therefore unlikely to support this species.

Mammals	*Petauroides volans volans* Greater Glider (southern and central subspecies)	E	E	The taxonomy of Greater Gliders is in flux (McGregor *et al.* 2020, TSSC 2022). The form occurring in this region is referred to *Petauroides volans volans* (Southern Greater Glider), in Queensland, and is listed under the EPBC Act as *Petauroides volans* (Greater Glider, Southern and Central). This subspecies occurs in south and central eastern Queensland, extending inland to the Carnarvon Ranges (Eyre *et al.* 2022, ALA 2025). Greater Gliders are exclusively arboreal, living in eucalypt woodlands and open forest with abundant large, hollow bearing trees (Eyre *et al.* 2022, TSSC 2022). This species shows a preference for large trees, typically selecting foraging trees >30 cm DBH, and den trees >50 cm DBH (Eyre *et al.* 2022). Individuals use multiple den hollows in live trees and stags, with overlapping home ranges as small as 3 ha, allowing for high density populations of gliders (Eyre *et al.* 2022). This species is sensitive to fragmentation and is vulnerable on the ground but may persist in small woodland patches and narrow corridors of riparian woodland where these are connected to other patches by scattered trees (Eyre *et al.* 2022, Norman & Mackey 2023).	N/A	**Unlikely to be present.** The Survey Area is outside the known range of the species. The closest records are from the Yuleba State Forest area about 90 km to the north-northeast (DETSI 2025a).
Mammals	*Phascolarctos cinereus* Koala	E	E	Found in coastal and inland areas throughout eastern Australia. Inland areas, such as the Southern Brigalow Belt, support a sparse and mobile population. Koalas require woodland and forest habitat with suitable food trees (mainly *Eucalyptus* spp.) (DAWE 2022). Eucalypts in riparian/alluvial areas are particularly favoured, including *E. tereticornis, E. camaldulensis* and in some areas *E. populnea* (Wu *et al.* 2012, Smith *et al.* 2013, Melzer *et al.* 2014). Other common food trees in the Southern Brigalow Belt include Coolibah (*E. coolabah*), Ironbarks (*E. crebra, E. fibrosa, E. melanophloia*), Grey gums (*E. major*), Grey Box (*E. moluccana, E. microcarpa*) and Spotted Gum (*Corymbia citriodora*) (Youngentob *et al.* 2021). Koalas outside riparian habitat in inland Queensland also require access to water sources within 1 km, especially during dry periods (Davies *et al.* 2013). The species is sensitive to habitat fragmentation (McAlpine *et al.* 2015, DAWE 2022). Koalas are capable of traversing gaps between habitat patches and may feed in scattered paddock trees, but dispersing individuals in open habitats are at greater risk of predation and vehicle collision (Youngentob *et al.* 2021, DAWE 2022). The species generally occurs at lower density in fragmented landscapes and depends on larger areas of primary habitat as source populations and as refuges in drought (Smith *et al.* 2013, McAlpine *et al.* 2015).	11.4.7	**Potentially present.** Potentially suitable foraging habitat with food trees and connectivity to surrounding vegetation is present at the western extremity of the Survey Area.

Reptiles	*Anomalopus mackayi* Five-clawed Worm-skink	V	E	A reduced limb skink found in grassland and grassy woodland on heavy black soil cracking-clay plains (Wilson 2022). Occurs on the Darling Downs of southern Queensland and the Darling River floodplains of northern inland NSW (ALA 2025, Wilson 2022). Australian government modelling of the species distribution predicts that the species may occur between Warwick and Condamine and between Goondiwindi, Narrabri and Walgett, NSW (DCCEEW 2023).	N/A	**Unlikely to be present.** The Survey Area is outside the modelled distribution of the species (DCCEEW 2023). The closest records of the species are over 160 km east-northeast of the Survey Area at Jimbour on the Darling Downs (ALA 2025, DETSI 2025a).
Reptiles	*Delma torquata* Collared Delma	V	V	This flap-footed lizard ranges from around Ipswich in south-east Queensland through the Southern Brigalow Belt, although occupancy appears extremely localised and patchy (DCCEEW 2025b, ALA 2025). Lives under surface rock or large woody debris in eucalypt woodlands and open forests (Peck 2012, Wilson 2022). The species is rarely encountered, difficult to detect and search effort in this region is low.	N/A	**Unlikely to be present.** Most of the Survey Area is devoid of vegetation. Habitat within the Survey Area is highly disturbed, very small, lacks suitable shelter sites and severely fragmented, and is therefore unlikely to support this species.
Reptiles	*Egernia rugosa* Yakka Skink	V	V	The range of this large, communal-living skink extends throughout the Brigalow Belt and adjacent areas (ALA 2025). It inhabits woodland and open forests dominated by *Eucalyptus, Acacia* and *Callitris* spp. and may also occur in grassland areas with regrowth trees (DCCEEW 2025b). The species requires loamy soils for burrows or shelters in sinkholes, abandoned rabbit warrens or piles of woody debris (Wilson 2022, Ferguson and Mathieson 2014, Eddie 2012). The species is rarely encountered, difficult to detect and search effort in this region is low.	11.4.7	**Potentially present.** The majority of habitat within the Survey Area is highly disturbed, very small, lacks suitable shelter sites and severely fragmented. It is therefore unlikely to support this species except in the extreme western end of the Survey Area.
Reptiles	*Furina dunmalli* Dunmall's Snake	V	V	A rarely encountered snake occurring in scattered patches of woodland and open forest throughout the Southern Brigalow Belt and adjacent parts of south-east Queensland (ALA 2025, DCCEEW 2025b). This species requires abundant leaf litter and woody debris for shelter and prey (Hobson 2012a). Feeds nocturnally on small lizards such as skinks and geckos (Shine 1981). Occurs on heavy soils (Wilson 2022), often with soil cracks and/or gilgais. The species is difficult to detect and search effort in this region is low.	N/A	**Unlikely to be present.** Most of the Survey Area is devoid of vegetation. Habitat within the Survey Area is highly disturbed, very small, lacks suitable shelter sites and severely fragmented, and is therefore unlikely to support this species.
Reptiles	*Hemiaspis damelii* Grey Snake	E	E	A small to medium sized snake generally found on flood-prone soils including floodplains and gilgai-forming clay plains (Wilson 2022). Shelters in soil cracks and under debris, forages mainly nocturnally, feed on frogs. Associated with ephemeral waterbodies in woodlands and open forests on heavy cracking clays, where it shelters in soil cracks (Hobson 2012b). It is also known to use cleared areas with suitable shelter and foraging habitat, such as gilgais with sedges and rushes.	N/A	**Unlikely to be present.** The Survey Area is within the broader distribution of the species (Wilson 2022). However, suitable cracking clay soils and gilgais are lacking from the Survey Area.

3.1.4.2 Field Survey Results

No EPBC Act-listed threatened fauna species were detected during the field assessment (Appendix D). No formal faunal surveys were conducted within the Survey Area. Faunal records reflect incidental sightings and opportunistic searches only.

3.1.4.3 Predictive Habitat Mapping

Ground-truthing of habitat was combined with ecologist knowledge to develop RE-based predictive habitat mapping for EPBC and NC Act-listed threatened fauna species either confirmed or assessed as likely to occur or potentially present within the Survey Area. Identified RE were classified as Primary or General habitat using the following definitions:

Primary Habitat – is an area containing resources that are considered essential for the maintenance of populations of the species (e.g. habitat for breeding, roosting, foraging and shelter, for either migratory or non-migratory species). Primary Habitat is defined from known records and/or expert advice, including the findings of preclearance surveys.

General Habitat – consists of areas or locations that are used by transient individuals or where species have been recorded but there is insufficient information to assess the area as Primary Habitat. General habitat may be defined from known records or, in the absence of specimen backed records, from expert knowledge of species habitat relationships. General habitat includes areas of suboptimal habitat for a species.

Mapping rules and the estimated extent of potentially suitable habitat for each threatened fauna species either confirmed present or likely to or having potential to occur within the Survey Area are summarised in Table 4. Refer to Table 3 (section 3.1.4) for a summary of habitat requirements for each species, including information derived from SPRAT profiles (DCCEEW 2025b). Where appropriate, mapped habitat includes patches of vegetation that are smaller than the minimum size thresholds for recognition as RE.

Table 4: Potentially suitable REs and estimated extent of Primary and General Habitat for EPBC-listed threatened fauna species confirmed, or assessed as likely to occur or potentially present within the Survey Area

Class	Species Name	Potentially Suitable REs within the Survey Area	Mapped Extent of Habitat (ha) within the Survey Area	Mapped Extent of Habitat (ha) within the Disturbance Footprint	Habitat Mapping Rules/Notes
Birds	*Calyptorhynchus lathami lathami* Glossy Black-Cockatoo	Primary: 11.4.7, 11.7.1 General: N/A	Primary: 2.14 General: 0.00	0.00	This species requires suitable *Casuarina* or *Allocasuarina* feed trees and large hollow-bearing eucalypts for nesting and roost sites. Primary Habitat includes remnant and mature regrowth RE of the nominated RE where they contain food trees. No mapped General Habitat is present. Note that RE 11.4.3 is excluded from predictive habitat mapping as food trees were absent from this patch within the Survey Area (i.e. it was Brigalow *Acacia harpophylla* dominated).
Birds	*Hirundapus caudacutus* White-throated Needletail	Primary: N/A General: 11.4.3, 11.4.7, 11.7.1,	Primary: 0.00 General: 2.44	0.00	This is an aerial foraging species that follows weather fronts over wooded and cleared landscapes. The species shows a general preference for wooded landscapes but it is not tied to any specific vegetation or habitat features in the landscape. It could therefore fly over any part of the Survey Area.

Class	Species Name	Potentially Suitable REs within the Survey Area	Mapped Extent of Habitat (ha) within the Survey Area	Mapped Extent of Habitat (ha) within the Disturbance Footprint	Habitat Mapping Rules/Notes
Mammals	*Phascolarctos cinereus* Koala	Primary: 11.4.7 General: N/A	Primary: 1.11 General: 0.00	0.00	Primary habitat comprises remnant and mature regrowth patches of eucalypt woodland dominated by known food trees. RE 11.7.1 occurring within the Survey Area is excluded as this vegetation did not contain eucalypts. General habitat comprises remnant and mature regrowth of other vegetation types which may contain a low abundance of known food trees; however, these species are not dominant within the canopy.
Reptiles	*Egernia rugosa* Yakka Skink	Primary: N/A General: 11.4.7	Primary: 0.00 General: 1.11	0.00	Mapped Primary Habitat is based on known records within the nominated RE and includes all remnant and mature regrowth of the nominated RE. Mapped General Habitat includes all remnant vegetation and mature regrowth of the nominated RE. This may include sub-optimal habitat.

Predictive habitat maps for threatened fauna species within the Survey Area are shown in Appendix E.

3.1.5 Migratory and Marine Fauna

PMST search results (DCCEEW 2025a) indicated the potential occurrence of eight migratory and 15 marine species listed under the EPBC Act. A likelihood of occurrence assessment of these species is provided in Table 5. No species of EPBC Act-listed migratory/marine fauna were recorded within the Survey Area.

Table 5: Assessment of likelihood of occurrence for EPBC Act-listed migratory and marine fauna within the Survey Area

Key to Status: Mi = Migratory; Ma = Marine; CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; SL = Special Least Concern; C = Least Concern.

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Potentially Suitable RE/ habitat	Likelihood of Occurrence
Birds	*Actitis hypoleucos* Common Sandpiper	Mi, Ma	SL	A spring-summer migrant to Australia usually found in coastal environments (muddy, sandy or rocky stream banks, mangrove margins) but may occur on any inland freshwater or saline wetland during passage, including artificial habitats (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). Much less commonly reported in the inland (ALA 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Apus pacificus* Fork-tailed Swift	Mi, Ma	SL	Seasonal migrant to Australia present October – April. An aerial species, commonly travelling in large flocks ahead of low-pressure cells in pursuit of insects which it takes on the wing (Menkhorst *et al.* 2020; Pizzey *et al.* 2012). Present over most habitat types including disturbed areas (ALA 2025, DoE 2015; DCCEEW 2025b). Most common in drier areas with large flocks roving over inland plains (DoE 2015; Tarburton 2015). In contrast to White-throated Needletail, populations of this species appear to be relatively stable (Tarburton 2015).	11.4.3, 11.4.7, 11.7.**1**	**Likely to be present.** May overfly any part of the Survey Area following spring-summer storm fronts.

Birds	*Bubulcus ibis* (listed as *Ardea ibis*) Cattle Egret	Ma	C	Widely distributed in northern and eastern Australia, also south-west Australia. Inhabits a wide range of dryland and wetland habitats including pastoral areas and notably associates with livestock (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). Nests colonially in flooded or swamp forests. An uncommon visitor to southern inland Queensland (ALA 2025).	N/A	**Potentially present.** The species may occasionally occur as a casual visitor within the cleared parts of the Survey Area.
Birds	*Calidris acuminata* Sharp-tailed Sandpiper	Mi, Ma, V	V	A non-breeding migratory wader species occurring on coastal and inland wetlands (Clemens *et al.* 2021a). Population monitoring within Australia suggests that this species has declined by around 45% over the past two decades (Clemens *et al.* 2021a). Individuals and flocks are regularly recorded across inland Queensland, especially in October and April during migration (ALA 2025, Birdlife Australia 2025; eBird 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Calidris ferruginea* Curlew Sandpiper	Mi, Ma, CE	CR	A non-breeding migratory wader species usually encountered on coastal and near-coastal saline and freshwater tidal and palustrine wetlands (Clemens *et al.* 2021b; DCCEEW 2025b). The Australian population has declined by > 50-80% over the past two decades (Clemens *et al.* 2021b). Passage migrants are occasionally present on inland wetlands, and the species is sparsely recorded across inland Queensland (ALA 2025, Birdlife Australia 2025; eBird 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Calidris melanotos* Pectoral Sandpiper	Mi, Ma	SL	A spring-summer migrant preferring freshwater wetlands, both inland and sub-coastally (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). Much less common than the related Sharp-tailed Sandpiper in Australia, there are few records in inland southern Queensland (ALA 2025).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Chalcites osculans* (listed as *Chrysococcyx osculans*) Black-eared Cuckoo	Ma	C	Breeding migrant to inland Australia, inhabiting dry woodlands and shrublands (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). The species is common in southern inland Queensland and there are multiple records in the Moonie River catchment (ALA 2025).	11.4.3, 11.4.7, 11.7.**1**	**Likely to be present.** Suitable habitat is present within remnant and regrowth woodland. The species has been recorded from the region and it is tolerant of fragmented and disturbed landscapes.

Birds	*Gallinago hardwickii* Latham's Snipe	Mi, Ma, V	V	A spring-summer migrant to Australia from breeding grounds on islands and mainland north-eastern Asia (Hansen *et al.* 2021). Declines of 30-50% in the Japanese breeding population, over the past decade, are attributed to drought and habitat change in Australia. The species follows a migration pathway through New Guinea to north-eastern Queensland, dispersing throughout eastern Australia as far as Tasmania (Hansen *et al.* 2021). This cryptic species favours wet pastures and boggy margins of vegetated wetlands (Pizzey *et al.* 2012) including artificial and ephemeral swamps, close to inundated areas (Hansen *et al.* 2021). Individuals and small groups are regularly reported from inland southern and central Queensland, particularly after rainy periods.	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.
Birds	*Haliaeetus leucogaster* White-bellied Sea-Eagle	Ma	C	Occurs around the entire Australian coast but also penetrates far inland on larger rivers (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). Feeds on a variety of vertebrates and will take carrion. There are multiple records of the species in the Moonie River catchment and surrounds (ALA 2025).	N/A	**Unlikely to be present.** Although transient individuals may overfly any part of the Survey Area, there is no wetland or riparian habitat which would attract this species.
Birds	*Hirundapus caudacutus* White-throated Needletail	Mi, Ma, V	V	An aerial insectivore present in eastern Australia as a spring/summer non-breeding migrant from Asia (Tarburton 2021). Occurs over most habitat types, including disturbed areas, but with a preference for foraging over wooded areas (Tarburton and Garnett 2021). Individuals roost on trunks and upper branches of tall trees at forest edges or trees on ridgelines, arriving and leaving roosts in the dark (Tarburton 2021). During cold conditions, birds may roost in tree hollows for a period of days, in a torpid state (Tarburton 2021). Migrating birds fly at high altitude and at night (Tarburton 2021). The species has few predators in Australia but predation of roosting birds by owls and, rarely, capture of birds in flight by Peregrine Falcon, have been recorded (Tarburton 2021). Ongoing declines appear largely due to loss of breeding sites (large trees with hollows) in northeast Asia (Tarburton and Garnett 2021). However, deaths from collision with wind turbines, in Australia and elsewhere, at night and in daylight, is an increasing threat for this bird (Tarburton 2021).	11.4.3, 11.4.7, 11.7.**1**	**Likely to be present.** May overfly any part of the Survey Area following spring-summer storm fronts.
Birds	*Merops ornatus* Rainbow Bee-eater	Ma	C	A widespread and abundant species that is a breeding migrant in this region. It arrives from the north in September, returning in April (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). It feeds on bees and other invertebrates, aerially, sallying from a perch, or on the ground. It is a summer breeder in the region but requires open areas of loamy soil for nesting tunnels.	11.4.3, 11.4.7, 11.7.**1**	**Likely to be present.** Likely to forage and potentially breed in the Survey Area during spring to summer.

Birds	*Motacilla flava* Yellow Wagtail	Mi, Ma	SL	Summer migrant in small numbers to mostly coastal northern Australia but birds often sighted in southern Australia: it prefers open grassed areas such as wetland margins, short pasture and parks (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). There are no existing records for southern inland Queensland (ALA 2025).	N/A	**Unlikely to be present.** There are no existing records of this species from southern inland Queensland (ALA 2025).
Birds	*Myiagra cyanoleuca* Satin Flycatcher	Ma	SL	A passage migrant in southern Queensland, with birds recorded in a variety of woodland types as well as parks and gardens but breeding in south-east Australia in more closed forest types (Menkhorst *et al.* 2020, Pizzey *et al.* 2012). There are scattered records in the Carnarvon and Expedition Ranges (ALA 2025).	N/A	**Unlikely to be present.** Vegetation within the Survey Area is unlikely to support this species as it is highly fragmented and not dense. The Survey Area is on the western periphery of the distribution of the species.
Birds	*Neophema chrysostoma* Blue-winged Parrot	Ma, V	V	This small, migratory parrot occurs across a broad area of southeastern Australia but is absent from the eastern coast and ranges (Menkhorst *et al.* 2020). The species breeds in near-coastal woodland in Tasmania, Victoria and South Australia, with post-breeding dispersal inland as far north as southwestern Queensland (Holdsworth *et al.* 2021). The species is listed as Marine under the EPBC Act due to a proportion of the population that migrates seasonally across Bass Strait. This gregarious, ground-feeding species eats grass seeds and forbs in woodland, saltmarsh and around wetland areas (Holdsworth *et al.* 2021, Menkhorst *et al.* 2020, Higgins 1999). In Queensland the species is restricted to the Channel Country and Darling River Floodplain landforms, with a distributional limit extending along the NSW border south and west of Goondiwindi, generally south of the Balonne Highway around Cunnamulla and Thargomindah, and then north in the Coopers Creek and Diamantina drainages to Windorah and Bedourie (ALA 2025). There are no records from the Maranoa region and the species is unlikely to occur within this area. Recording rates for this species have declined significantly in the core breeding distribution in Tasmania and Victoria, suggesting population-wide decline (TSSC 2023d, Holdsworth *et al.* 2021).	N/A	**Unlikely to be present.** In Queensland this species is restricted to the Darling River floodplain and Channel Country. There are no records of this species from the vicinity of the Survey Area with the nearest reliable sightings being over 130 km to the south between Boomi and Garah in NSW (ALA 2025).

Birds	*Rostratula australis* Australian Painted Snipe	Ma, E	E	A secretive nomadic wader that forages and breeds in variably inundated wetlands with features such as complex shorelines, areas of shallow water, dense low vegetation and exposed wet mud (DEE 2019; Rogers *et al.* 2021). Uses both artificial and natural ephemeral and permanent wetlands (Marchant and Higgins 1993). Forages at shallow edges and adjacent vegetated margins of wetlands (DCCEEW 2025b) for seeds and invertebrates (Rogers *et al.* 2021). Recorded over much of Australia other than the driest interior, but most frequently recorded within the Murray-Darling Basin (ALA 2025). Partially migratory, with birds in south-eastern Australia moving in autumn-winter to coastal areas of central and northern Queensland, where it occurs year-round (Rogers *et al.* 2021). The species is unpredictable in occurrence and difficult to detect. Total numbers are estimated at below 2500 individuals (DEE 2019).	N/A	**Unlikely to be present.** No wetland habitat is present within the Survey Area.

3.1.6 Internationally and Nationally Important Wetlands

No internationally or nationally significant wetlands are present within or near the Survey Area.

3.2 Matters of State Environmental Significance

3.2.1 State Conservation Areas

There are no State conservation areas including national parks, state forests, resource reserves, other estates, nature refuges, special wildlife reserves, State marine parks (highly protected zones) or Fish Habitat Areas within the Survey Area.

3.2.2 Regulated Vegetation

3.2.2.1 Category A, B, C and R Areas

There is no State regulated vegetation (DNRMMRRD 2025c) mapped within the Survey Area.

3.2.2.2 VM Act Wetlands

No prescribed RE (not within an urban area) that intersect a wetland on the vegetation management wetlands map are mapped within the Survey Area (Appendix A).

3.2.2.3 VM Act Watercourse Vegetation

No VM Act watercourses are present within the Survey Area (Appendix A).

3.2.3 Regional Ecosystems

State government mapped remnant RE (biodiversity status) (DETSI 2025h) and mature regrowth (DETSI 2025i) is shown in Appendix A. None of the vegetation within the Survey Area is mapped by the state government as remnant or high value regrowth.

Ground-truthed RE types within the Survey Area are listed in Table 6. These areas are mapped in Appendix B. Representative images of remnant vegetation within the Survey Area are shown in Section 8 (Figures 2a-f). Areas of ground-truthed remnant and high value regrowth vegetation were present within the Survey Area but not within the Disturbance Footprint.

Table 6: Ground-truthed RE detected within the Survey Area

Key to Status: E = Endangered; OC = Of Concern; LC = Least Concern; NCAP = No Concern at Present

RE Code	VM Act Class	Biodiversity Status	Short Description (Queensland Herbarium 2024)	Extent – remnant within the Survey Area (ha)	Extent – mature regrowth within the Survey Area (ha)	Extent remnant within the Disturbance Footprint (ha)	Extent mature regrowth within the Disturbance Footprint (ha)
11.4.3	E	E	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains	0.00	0.30	0.00	0.00
11.4.7	E	E	*Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains	1.11	0.00	0.00	0.00
11.7.1	LC	OC	*Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust	1.03	0.00	0.00	0.00

3.2.4 BioCondition Assessment

No BioCondition assessments were completed as none of the ground-truthed remnant or high value regrowth vegetation was present within the Disturbance Footprint. In addition, ground-truthed vegetation patches within the Survey Area were smaller than the BioCondition plot size.

3.2.5 Threatened Flora and Essential Habitat

One species of flora scheduled as Near Threatened under the NC Act was identified within the buffered desktop search area this being Ooline (*Cadellia pentastylis*) (DETSI 2025a, ALA 2025). No NC Act-listed threatened flora species were detected within the Survey Area (Appendix C).

No VM Act Essential Habitat is mapped within the Survey Area (Appendix C).

The Survey Area and Disturbance Footprint are not located within a High Risk Area (DETSI 2025c) as shown on a Protected Plants Flora Survey Trigger Map (Appendix C).

3.2.6 Special Least Concern (SLC) Flora

One species of flora scheduled as SLC under the NC Act was detected within the Survey Area, this being Kurrajong (*Brachychiton populneus* subsp*. trilobus*). Locations of recorded SLC flora are shown in Appendix C. Representative images of SLC flora are shown in Section 8 (Figure 3a).

3.2.7 Biosecurity Act and Other Weeds of Management Concern

Two species of weeds (invasive plants) scheduled as Category 3 restricted matter under the Biosecurity Act were detected within the Survey Area these being Velvety Tree Pear and Common Pest Pear. These species are also WoNS as described in Section 3.1.3. The locations of Biosecurity Act weeds within the Survey Area are shown in Appendix C. Representative images of Biosecurity Act weeds are shown in Section 8 (Figures 1a-b).

3.2.8 Threatened Fauna and Essential Habitat

3.2.8.1 Likelihood of Occurrence Assessment

Desktop searches of public databases (DETSI 2025a, ALA 2025) contained no records of NC Act-listed threatened fauna species within the buffered desktop search area. There are no state government mapped areas of Essential Habitat within the Survey Area (DETSI 2025l). No NC Act-listed threatened species were found during the field survey; however, no comprehensive fauna surveys were undertaken under this scope.

A likelihood of occurrence assessment for threatened fauna that are listed under both the EPBC Act and the NC Act is presented in Table 3 (Section 3.1.4). A likelihood of occurrence assessment for NC Act-listed threatened and near threatened fauna which are not also EPBC Act-listed is shown in Table 7.

Table 7. Likelihood of occurrence assessment for NC Act-listed threatened and near threatened fauna (additional to EPBC Act-listed species) within the Survey Area

Class	Scientific & Common Name	NC Act Status	Distribution and Known Habitat Use	Potentially Suitable RE within the Survey Area	Likelihood of Occurrence within the Survey Area
Reptiles	*Aspidites ramsayi* Woma	NT	A snake recorded from a variety of woodland and shrubland habitats in sub-humid to arid Australia (Wilson 2022). Shelters in hollow logs and abandoned animal burrows (e.g. rabbit warrens). It preys on reptiles and small mammals.	11.4.3, 11.4.7, 11.7.1	**Likely to be present** Potentially suitable habitat (dry woodland and open forest) is present within the Survey Area.

3.2.8.2 Field Survey Results

No NC Act-listed threatened species were detected during the field survey; however, no intensive fauna surveys were undertaken.

3.2.8.3 Essential Habitat

There is no State government mapped Essential Habitat (DES 2022) for NC Act-listed threatened fauna within the Survey Area (Appendix D).

3.2.8.4 State Koala Mapping

The parts of Queensland where koalas are known to occur has been divided into three koala districts - Koala District A, Koala District B and Koala District C. Each Koala district is made up of areas with comparable Koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes. The Survey Area is located within Koala District C.

Koala Habitat Areas are areas of vegetation that have been determined to contain Koala habitat that is essential for the conservation of a viable Koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to Koala habitat (e.g. landcover, soil, terrain, climate and ground water). In order to protect this important Koala habitat, clearing controls have been introduced into the *Planning Regulation 2017* for development in Koala habitat areas. Koala Habitat Areas only exist in Koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area (which includes the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley, Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent). As the Survey Area is located within Koala district C, there is no mapped Koala Habitat within the Survey Area or Disturbance Footprint.

Koala Priority Areas are large, connected areas that have been determined to have the highest likelihood of achieving conservation outcomes for Koalas based on the combination of habitat suitability, biophysical variables with known relationships to Koala habitat (e.g. landcover, soil, terrain, climate and ground water) and a koala conservation cost benefit analysis. Koala priority areas

only exist in Koala District A (as described above). As the Survey Area is located within Koala district C, there are no mapped Koala Priority Areas within the Survey Area or Disturbance Footprint.

3.2.8.5 Predictive Habitat Mapping

Habitat mapping rules and the estimated extent of potentially suitable habitat for NC Act-listed threatened or near threatened fauna species either confirmed present, likely to occur or potentially present within the Survey Area and which are also EPBC Act listed are shown in Table 3. Habitat mapping rules and the estimated extent of potentially suitable habitat for species listed under the NC Act only are summarised in Table 8. Refer to Tables 3 and 7 for a summary of habitat requirements for the relevant species.

Table 8: Potentially suitable REs and estimated extent of Primary and General Habitat for NC-listed threatened and near threatened fauna species (additional to EPBC Act-listed species) confirmed or assessed as likely to occur or potentially present within the Survey Area

Class	Species Name	Potentially Suitable REs within the Survey Area	Mapped Extent of Habitat (ha) within the Survey Area	Mapped Extent of Habitat (ha) within the Disturbance Footprint	Habitat Mapping Rules/Notes
Reptiles	*Aspidites ramsayi* Woma	Primary: N/A General: 11.4.3, 11.4.7, 11.7.1	Primary: 0.00 General: 2.43	Primary: 0.00 General: 0.00	Mapped General Habitat includes remnant and regrowth of the nominated RE.

3.2.9 Special Least Concern and Other Notable Fauna

3.2.9.1 Likelihood of Occurrence Assessment

A likelihood of occurrence assessment for non-migratory terrestrial SLC fauna is summarised in Table 9.

Table 9: Assessment of likelihood of occurrence for SLC fauna within the Survey Area

Key to Status: CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; SLC = Special Least Concern

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Potentially Suitable RE within the Survey Area	Likelihood of Occurrence
Mammals	Short-beaked Echidna *Tachyglossus aculeatus*	-	SLC	A ubiquitous inhabitant of a wide variety of landforms and climatic regimes across Australia (Augee 2008) where it digs in soil and litter for ants, termites and their larvae and eggs. It is commonly found in a variety of woodland types as well as cleared pastoral and farming lands with suitable microhabitat and food sources.	11.4.3, 11.4.7, 11.7.1	**Likely to be present.** The closest records of the species are about 8 km to the northwest of the Survey Area (ALA 2025, DETSI 2025a). The species is likely to have a patchy occurrence within regrowth and remnant vegetation within the Survey Area. It may also traverse disturbed habitats.

3.2.9.2 Field Survey Results

No SLC fauna species were detected during the field survey, but it is likely that Short-beaked Echidna (*Tachyglossus aculeatus*) occurs within the Survey Area.

3.2.9.3 Predictive Habitat Mapping

Mapping rules and the estimated extent of potentially suitable habitat for non-migratory terrestrial SLC fauna species confirmed or assessed as likely to occur or potentially occurring within the Survey Area are summarised in Table 10. Refer to Table 9 (for a summary of habitat requirements for this species.

Table 10: Potentially suitable REs and estimated extent of habitat for non-migratory terrestrial SLC fauna species within the Survey Area.

Class	Scientific and Common Name	Potentially Suitable REs within the Survey Area	Mapped Extent of Habitat (ha) within the Survey Area	Habitat Mapping Rules/Notes
Mammals	Short-beaked Echidna *Tachyglossus aculeatus*	Primary: N/A General: 11.4.3, 11.4.7, 11.7.1	Primary: 0.0 General: 2.44	Mapped General Habitat includes remnant and regrowth of the nominated RE.

3.2.10 Pest Fauna and Invasive Species

Five species of introduced fauna have been recorded within the desktop search area, these being: Common Myna (*Acridotheres tristis*), Cane Toad (*Rhinella marina*), Cat (*Felis catus*), Dog (*Canis familiaris*) and Pig (*Sus scrofa*) (DETSI 2025a, ALA 2025). No introduced fauna was detected within the Survey Area during the field survey. It is likely that other pest species, such as Rabbit (*Oryctolagus cuniculus*) also occur within the Survey Area.

3.2.11 Fauna Habitat Features and Potential Breeding Places

The results of fauna habitat assessments conducted within the Survey Area have been provided within spatial data. Representative examples of habitat features such as hollow-bearing trees, decorticating trees/logs, hollow-bearing logs, termitaria and threatened species food trees were recorded within the Survey Area, primarily within remnant and regrowth vegetation. The locations of these features have also been provided in spatial data. Fauna microhabitat features were scarce within non-remnant areas due to pre-existing disturbances.

3.2.12 Wetlands, Lakes and Springs

3.2.12.1 VM Act Wetlands

No prescribed RE (not within an urban area) that intersect a wetland on the vegetation management wetlands map were mapped within the Survey Area (Appendix A).

3.2.12.2 EP Act Wetlands

No Wetland Protection Areas (WPA) or Wetlands of High Ecological Significance (HES) are mapped within the Survey Area (Appendix A). One Wetland of General Ecologically Significance (GES), as shown on a *Map of Queensland Wetland Environmental Values* (DETSI 2025d), occurs to the immediate west of the Survey Area as does its trigger area. However, there are no GES or trigger areas that intersect the Survey Area (Appendix A).

3.2.12.3 Wetlands in High Value Ecological Waters

There are no Wetlands in High Ecological Value Waters, as identified under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*, (Schedule 2) mapped within the Survey Area (Appendix A).

3.2.12.4 Other Wetlands

No springs, lakes or other wetlands as per Queensland Wetland Mapping (Appendix A, F) are mapped within the Survey Area. No wetlands which met wetland criteria as per DERM (2011) were detected within the Survey Area. No springs as defined in Schedule 4 of the Water Act were present within the Survey Area.

3.2.13 Watercourses & Drainage Features

3.2.13.1 Mapped Streams

No mapped streams were present within the Survey Area.

3.2.13.2 Watercourses in High Ecological Value Waters

No watercourses that are in High Ecological Value Waters, as identified under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*, (Schedule 2), were present within the Survey Area (Appendix A).

3.2.13.3 VM Act Watercourse Vegetation

No VM Act watercourses were present within the Survey Area (Appendix A). Therefore, there is no regulated vegetation within a watercourse buffer and regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse or relevant drainage feature within the Survey Area.

3.2.13.4 Waterways Providing for Fish Passage

The Queensland waterways for waterway barrier works mapping helps identify waterways as defined by the *Fisheries Act 1994* and the fisheries interest in waterways providing fish passage (a matter of state environmental significance under the *Environmental Offsets Act 2014*). No waterways with a fish passage attribute are present within the Survey Area.

3.2.14 Offset Areas

State government mapping does not show any legally secured offset areas (offset register) or legally secured offset areas (vegetation offsets) within the Survey Area (DETSI 2025g).

3.2.15 Environmentally Sensitive Areas (ESA)

In state government mapping of the Survey Area, no ESA are shown (DETSI 2025e).

Two ESAs were identified within the Survey Area; however, none are within the Disturbance Footprint:

- Category B: Endangered Regional Ecosystems – regrowth and remnant (biodiversity status).
- Category C: Of Concern Regional Ecosystems – remnant (biodiversity status).

Ground-truthed regional ecosystems comprising Category B and C ESA are shown in Appendix G.

4 Potential Impacts

The following assessment of potential impacts is based on the proposed Disturbance Footprint provided by the client.

4.1 Matters of National Environmental Significance

4.1.1 Threatened Ecological Communities

There is no TEC within the Survey Area therefore there will be no impact on any TEC.

4.1.2 Threatened Flora

No EPBC Act-listed threatened flora were assessed as likely to occur or having potential to occur within the Survey Area (Table 1). No EPBC Act-listed threatened flora were detected or expected to occur within the Survey Area; therefore the proposed action will not impact upon any populations of EPBC Act-listed threatened flora.

4.1.3 Threatened Fauna

No EPBC Act-listed threatened fauna species were detected during the field assessment. EPBC Act-listed threatened fauna species that have been confirmed present or assessed as likely to occur or potentially occurring within the Survey Area are listed within Table 3.

DoE (2013) documents a number of potential impacts on Matters of National Environmental Significance (MNES) that may result from an action (e.g. construction, operation and decommissioning of gas-field infrastructure). Threatened fauna are at risk of significant impact if an action results in, or has a real possibility of resulting in, any of a series of adverse outcomes.

Potential impacts on critically endangered and endangered fauna either confirmed or assessed as likely to occur or potentially occurring within the Survey Area are summarised below in Table 11, following the EPBC Act *Guidelines for Significant Impacts on Matters of National Environmental Significance* (DoE 2013).

Table 11: Assessment of potential significant impacts (as per Significant Impact criteria within DoE 2013) upon EPBC Act-listed critically endangered and endangered fauna species within the Survey Area

Species / Status	**Lead to a long-term decrease in the size of a population**	**Reduce the Area of Occupancy (AoO) of the species**	**Fragment an existing population into two or more populations**	**Adversely affect habitat critical to the survival of a species**	**Disrupt the breeding cycle of a population**	**Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**	**Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered threatened species' habitat**	**Introduce disease that may cause the population to decline**	**Interfere with the recovery of the species**	**Significant Impact (DoE 2013)**
Phascolarctos cinereus Koala EPBC Act: Endangered	No. There will be no loss of remnant/regrowth habitat for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat for this species, therefore there will be no reduction in the AoO for this species.	No. The species is mobile and can traverse linear and non-linear clearings. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat for this species; therefore the Project will not affect habitat critical to the survival of the species.	No. There will be no loss of remnant/regrowth habitat for this species; therefore the Project will not disrupt the breeding cycle of a population.	No. There will be no loss of remnant/regrowth habitat for this species. There will be no reduction in the availability or quality of habitat because of Project activities.	None known.	None known. Chlamydia occurs in Koala populations in southern inland Queensland.	No. The Project will not result in the loss of any remnant or regrowth habitat. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant or regrowth habitat. Therefore there will be no Significant Impact upon this species.

Potential impacts on vulnerable fauna assessed as likely to occur or potentially occurring within the Survey Area are summarised below in Table 12, following the EPBC Act *Guidelines for Significant Impacts on Matters of National Environmental Significance* (DoE 2013).

Table 12: Assessment of potential significant impacts (as per Significant Impact criteria within DoE 2013) upon EPBC Act-listed vulnerable fauna species within the Survey Area

Species / Status	**Lead to a long-term decrease in the size of an important population of a species**	**Reduce the Area of Occupancy (AoO) of an important population**	**Fragment an existing population into two or more populations**	**Adversely affect habitat critical to the survival of a species**	**Disrupt the breeding cycle of an important population**	**Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**	**Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.**	**Introduce disease that may cause the species to decline.**	**Interfere substantially with the recovery of the species.**	**Significant Impact (DoE 2013)**
Calyptorhynchus lathami lathami Glossy Black-Cockatoo EPBC Act: Vulnerable	No. There will be no loss of remnant/regrowth habitat or food trees for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat for this species, therefore there will be no reduction in the AoO for this species. This mobile and wide-ranging species is capable of traversing non-remnant areas between nest/roost trees and feed trees.	No. The disturbance will not affect dispersal of this species, which travels long distances between suitable foraging trees. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat or food trees for this species; therefore the Project will not affect habitat critical to the survival of the species.	No. There are no known important populations of the species within the Survey Area and potential nest trees are absent from the Disturbance Footprint.	No. There will be no loss of remnant/regrowth habitat or food trees for this species. There will be no reduction in the availability or quality of habitat because of Project activities.	None known.	None known.	No. The Project will not result in the loss of any remnant/regrowth habitat or any food trees. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant/regrowth habitat or food/nesting or shelter trees. Therefore there will be no Significant Impact upon this species.

Species / Status	Lead to a long-term decrease in the size of an important population of a species	Reduce the Area of Occupancy (AoO) of an important population	Fragment an existing population into two or more populations	Adversely affect habitat critical to the survival of a species	Disrupt the breeding cycle of an important population	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Introduce disease that may cause the species to decline.	Interfere substantially with the recovery of the species.	Significant Impact (DoE 2013)
Hirundapus caudacutus White-throated Needletail EPBC Act: Vulnerable	No. The development is not materially relevant to this aerial species.	No. Individuals of this species range widely and are not dependent on resources in this area.	No. The development does not constitute a barrier to this species.	No. The development is not materially relevant to this aerial species.	No. The species does not breed in Australia.	No. The development is not materially relevant to this aerial species.	None known.	None known.	No. The development is not materially relevant to this aerial species.	No. The species occurs in the region as a non-breeding summer migrant. It is highly mobile. Occurrence of the species appears dependent on landscape conditions and weather rather than specific resources within the Survey Area.

Species / Status	Lead to a long-term decrease in the size of an important population of a species	Reduce the Area of Occupancy (AoO) of an important population	Fragment an existing population into two or more populations	Adversely affect habitat critical to the survival of a species	Disrupt the breeding cycle of an important population	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Introduce disease that may cause the species to decline.	Interfere substantially with the recovery of the species.	Significant Impact (DoE 2013)
Egernia rugosa Yakka Skink EPBC Act: Vulnerable	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species, therefore there will be no reduction in the AoO for this species.	No. The disturbance will not affect dispersal of this species. The species can traverse between habitat patches. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species; therefore the Project will not affect habitat critical to the survival of the species.	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species; therefore the Project will not disrupt the breeding cycle of a population.	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species. There will be no reduction in the availability or quality of habitat because of Project activities.	None known.	None known.	No. The Project will not result in the loss of any remnant/regrowth habitat or microhabitat features. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant/regrowth habitat or microhabitat features. Therefore there will be no Significant Impact upon this species.

4.1.4 Migratory Fauna

DoE (2013) also identifies criteria for identifying significant impacts on EPBC-listed migratory species that are not also listed as threatened. These criteria are similarly applicable to listed marine species. An action is likely to have a significant impact on a listed migratory species if it results in:

- isolation, modification or destruction of important habitat for this species;
- establishment of a harmful invasive species in an area of important habitat; and
- disruption to breeding, feeding, migration, resting behaviour or life-expectancy of an ecologically significant proportion of the population of a listed species.

Government guidelines for assessing the significance of impacts refer to the linked concepts of 'important habitat' and an 'ecologically significant proportion' of a listed species' population (DoE 2013). The definition of these terms vary across species ecology, range, population size and circumstances (DoE 2013; DoE 2015). DoEE (2017) defines important habitat for migratory shorebirds that aggregate in flocks as an area:

- that has been identified as internationally important for shorebirds; or
- that supports at least 0.1 per cent of the East Asian-Australasian flyway population; or,
- that supports at least 2000 migratory shorebirds; or
- that supports at least 15 migratory shorebird species.

The Survey Area contains no wetland habitat therefore the Project will not have any impact on migratory wetland species.

The migratory White-throated Needletail and Fork-tailed Swift are aerial species that will not be impacted upon by the Project as this development is not materially relevant to them.

The Survey Area is unlikely to harbour an ecologically significant proportion of populations of any other listed migratory species. The proposed action is unlikely to reduce the geographic range of any of these species and the Survey Area does not otherwise contain or constitute important habitat for these species. Therefore, the proposed action is unlikely to result in significant impacts on any listed migratory species.

4.1.5 Internationally and Nationally Important Wetlands

No internationally or nationally important wetlands occur at or near the Survey Area. The Project will therefore not impact upon any internationally or nationally important wetlands.

4.2 Matters of State Environmental Significance

4.2.1 Regional Ecosystems

The proposed development will not impact on any ground-truthed remnant or high value regrowth Endangered or Of Concern RE as none of this vegetation is within the Disturbance Footprint.

4.2.2 Threatened Flora

No NC Act-listed threatened flora was confirmed present or assessed as likely to occur or having potential to occur within the Survey Area (Table 1). No NC Act-listed threatened flora was detected or are expected to occur within the Survey Area; therefore, the proposed action will not impact upon any populations of NC Act-listed threatened flora.

4.2.3 Threatened Fauna

NC Act-listed threatened fauna that were confirmed present or assessed as likely to occur or potentially occurring within the Survey Area are listed within Tables 3 and Table 7. Predictive habitat mapping for NC Act-listed fauna potentially occurring within the Survey Area is shown in Appendix E. Potential impacts on critically endangered, endangered and vulnerable fauna species that are NC Act-listed are assessed in Table 13. This assessment is consistent with the Significant Residual Impact criteria from Section 5 of the *Significant Residual Impact Guideline* (DEHP 2014).

Table 13: Assessment of potential significant impacts upon NC Act-listed critically endangered, endangered and vulnerable fauna species potentially present within the Survey Area

Species / Status	**Lead to a long-term decrease in the size of a population.**	**Reduce the Extent of Occurrence (EoO) of the species.**	**Fragment an existing population / result in genetically distinct populations forming as a result of habitat isolation.**	**Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.**	**Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat.**	**Introduce disease that may cause the population to decline.**	**Interfere with the recovery of the species**	**Significant Residual Impact (SRI) (DEHP 2014)**
Calyptorhynchus lathami lathami Glossy Black-Cockatoo NC Act: Vulnerable	No. There will be no loss of remnant/regrowth habitat or food trees for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat for this species, therefore there will be no reduction in the EoO for this species. This mobile and wide-ranging species is capable of traversing non-remnant areas between nest/roost trees and feed trees.	No. The disturbance will not affect dispersal of this species, which travels long distances between suitable foraging trees. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat or food trees for this species. There will be no reduction in ecologically significant locations (breeding, feeding, nesting, migration or resting sites) because of Project activities.	None known.	None known.	No. The Project will not result in the loss of any remnant/regrowth habitat or any food trees. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant/regrowth habitat or food/nesting or shelter trees. Therefore there will be no SRI upon this species.
Hirundapus caudacutus White-throated Needletail NC Act: Vulnerable	No. The development is not materially relevant to the species.	No: Individuals of this species range widely and are not dependent on resources in this area.	No: The development does not constitute a barrier to this species.	No: The development is not materially relevant to the species.	None known	None known	No: The development is not materially relevant to the species.	No. The species occurs in the region as a non-breeding summer migrant. It is highly mobile. Occurrence of the species appears dependent on landscape conditions and weather rather than specific resources within the Disturbance Footprint.

Species / Status	Lead to a long-term decrease in the size of a population.	Reduce the Extent of Occurrence (EoO) of the species.	Fragment an existing population / result in genetically distinct populations forming as a result of habitat isolation.	Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat.	Introduce disease that may cause the population to decline.	Interfere with the recovery of the species	Significant Residual Impact (SRI) (DEHP 2014)
Phascolarctos cinereus Koala NC Act: Endangered	No. There will be no loss of remnant/regrowth habitat for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat for this species, therefore there will be no reduction in the EoO for this wide-ranging species.	No. The species is mobile and can traverse linear and non-linear clearings. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat or food trees for this species. There will be no reduction in ecologically significant locations (breeding, feeding, nesting, migration or resting sites) because of Project activities.	None known.	None known. Chlamydia occurs in Koala populations in southern inland Queensland.	No. The Project will not result in the loss of any remnant or regrowth habitat. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant or regrowth habitat. Therefore there will be no SRI upon this species.
Egernia rugosa Yakka Skink NC Act: Vulnerable	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species; therefore there will be no long-term decrease in the size of a population.	No. There will be no loss of remnant/regrowth habitat for this species, therefore there will be no reduction in the EoO for this wide-ranging species.	No. The disturbance will not affect dispersal of this species. The species can traverse between habitat patches. Habitat within the Survey Area is already fragmented and will not be further fragmented by the Project.	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species. There will be no reduction in ecologically significant locations (breeding, feeding, nesting, migration or resting sites) because of Project activities.	None known.	None known.	No. The Project will not result in the loss of any remnant/regrowth habitat or microhabitat features. Therefore the Project will not interfere with the recovery of the species.	No. The Project will not result in the loss of any remnant/regrowth habitat or microhabitat features. Therefore there will be no SRI upon this species.

4.2.4 SLC Fauna

SLC fauna (other than those that are also Marine/Migratory species) that may potentially occur within the Survey Area are discussed in section 3.2.9. Short-beaked Echidna may shelter and/or forage within any of the ground-truthed RE. It may also periodically traverse clearings with little to no woody vegetation. Predictive habitat for SLC fauna potentially occurring within the Survey Area is shown in Appendix E. Potential impacts on SLC fauna are assessed in Table 14.

Table 14: Assessment of potential significant impacts upon NC-Act listed SLC (non-migratory) fauna species confirmed, likely to occur or potentially present within the Survey Area

Class	Species	Lead to a long-term decrease in the size of a local population	Reduce the Extent of Occurrence (EoO) of the species.	Fragmentation of an existing population.	Result in genetically distinct populations forming as a result of habitat isolation.	Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.	Significant Residual Impact (DEHP 2014)
Mammals	*Tachyglossus aculeatus* Short-beaked Echidna	No. There will be no loss of remnant/regrowth habitat or microhabitat features for this species. The Project will therefore not result in a decrease in the size of a local population.	No. There will be no loss of remnant/regrowth habitat for this species. The Project will therefore not reduce the EoO of the species.	No. The species is mobile and the Project does not pose a barrier to dispersal of this species.	No. There will be no loss of remnant/regrowth habitat for this species. Activities associated with the Project will not pose a barrier to dispersal of this species as this species is mobile and existing disturbances are present.	No. Activities associated with the Project will not disturb any remnant or regrowth habitat nor any microhabitat features.	No. The species is likely to have a patchy occurrence aligned with food and shelter resources within the Survey Area. Suitable habitat features such as logs, other woody debris and termitaria were very scarce within the Survey Area. The Project will not result in the loss of any remnant or regrowth habitat. Therefore there will be no SRI upon this species.

4.2.5 Environmentally Sensitive Areas

An assessment of SRI on ESA within the Survey Area is summarised in Table 15.

Table 15: Assessment of potential significant residual impacts upon ESA present within the Survey Area

ESA Category	ESA Description	Total Area (ha) within the Disturbance Footprint	Significant Residual Impact (DEHP 2014)
A	National Parks, Conservation Parks, Forest Reserves, Special Wildlife Reserve	N/A	N/A
	Wet Tropics World Heritage Area	N/A	N/A
	Great Barrier Reef Region	N/A	N/A
	Marine Parks other than General Use Zones	N/A	N/A
B	Ramsar Sites	N/A	N/A
	Special Forestry Areas	N/A	N/A
	Fish Habitat Areas	N/A	N/A
	Endangered Regional Ecosystems – regrowth and remnant (biodiveristy status) – RE 11.4.3 and 11.4.7 (total 1.41 ha in Survey Area)	0.00	No
	Endangered Regional Ecosystems – remnant (biodiveristy status) – RE 11.4.7 (total 1.11 ha in Survey Area)	0.00	No
	Endangered Regional Ecosystems – high value regrowth (biodiveristy status) – RE 11.4.3 (total 0.30 ha in Survey Area)	0.00	No
	General Use Zones of Marine Parks	N/A	N/A
	Marine Plants	N/A	N/A
C	Essential Habitat – total	N/A	N/A
	Koala Plan	N/A	N/A
	Nature Refuges	N/A	N/A
	Resources Reserve	N/A	N/A
	State Forests and Timber Reserves	N/A	N/A
	Of Concern Regional Ecosystems – remnant (biodiveristy status) – RE 11.7.1 (total 1.03 ha in Survey Area)	0.00	No
	'Protected wildlife habitat' that is category A, B or C on the Remnant Vegetation Management Map, in accordance with section 20A of the VM Act, for a species of wildlife listed as critically endangered, endangered or vulnerable under the NC Act as follows:	0.00	No
	SLC fauna habitat: Short-beaked Echidna (*Tachyglossus aculeatus*): ground-truthed remnant RE 11.4.7, 11.7.1 and high value regrowth 11.4.3 (total 2.44 ha in Survey Area).	0.00	No

4.2.6 Watercourses, Wetlands and Springs

There are no watercourses, wetlands or springs within the Survey Area, therefore there will be no impact to these features.

5 Recommendations

It is recommended that the findings in this report are considered during detailed project planning such that disturbance to the ecological values within the Survey Area may be avoided wherever practical.

Placement of any infrastructure within ground-truthed remnant or high value regrowth vegetation should be avoided.

Clearing of or disturbance to any identified fauna habitat features should be avoided wherever possible. Should any identified fauna habitat features need to be disturbed, a qualified fauna spotter/catcher should be engaged to assist with the relocation of fauna during disturbance to any potential fauna habitat shelter and/or breeding places within the Disturbance Footprint.

6 Conclusions

An ecological assessment within the Survey Area identified the following ecological values/potential constraints:

Matters of National Environmental Significance:

- No Threatened Ecological Communities (TEC) were present within the Survey Area.
- No EPBC Act-listed threatened flora species have potential to occur or were recorded within the Survey Area.
- Two species of WoNS were detected within the Survey Area, namely:
  - Common Pest Pear (*Opuntia stricta*); and
  - Velvety Tree Pear (*O. tomentosa*).
- No EPBC Act-listed threatened fauna species were detected within the Survey Area.
- The following EPBC Act-listed threatened fauna are likely to occur or have potential to occur within the Survey Area:
  - Glossy Black-Cockatoo - eastern (*Calyptorhynchus lathami lathami*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
  - White-throated Needletail (*Hirundapus caudacutus*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
  - Koala (*Phascolarctos cinereus*) – EPBC Act: Endangered; NC Act: Endangered.
  - Yakka Skink (*Egernia rugosa*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
- No EPBC Act-listed marine/migratory fauna were recorded within the Survey Area. There is potential for occurrence of EPBC Act-listed migratory and marine fauna in remnant and high value regrowth RE within the Survey Area.
- No Wetlands of International or National Significance occur within or in close proximity to the Survey Area.

Matters of State Environmental Significance:

- One remnant Endangered (biodiversity status) RE was recorded within the Survey Area:
  - 11.4.7: *Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains
- One remnant Of Concern (biodiversity status) RE was recorded within the Survey Area:
  - 11.7.1: *Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust
- One high value regrowth (biodiversity status) RE was recorded within the Survey Area:
  - 11.4.3: *Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains
- No areas of remnant or high value regrowth were present within the Disturbance Footprint.
- No NC Act-listed threatened flora species were detected or are expected to occur within the Survey Area.
- One SLC flora species was recorded within the Survey Area:
  - Kurrajong (*Brachychiton populneus* subsp. *trilobus*).
- Two species of Biosecurity Act Category 3 Restricted Matter invasive plants were recorded within the Survey Area:
  - Common Pest Pear (*Opuntia stricta*); and
  - Velvety Tree Pear (*O. tomentosa*).
- No NC Act-listed threatened fauna species were detected within the Survey Area.
- The following NC Act-listed threatened fauna are likely to occur or have potential to occur within the Survey Area:
  - Glossy Black-Cockatoo - eastern (*Calyptorhynchus lathami lathami*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
  - White-throated Needletail (*Hirundapus caudacutus*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
  - Koala (*Phascolarctos cinereus*) – EPBC Act: Endangered; NC Act: Endangered.

- Yakka Skink (*Egernia rugosa*) – EPBC Act: Vulnerable; NC Act: Vulnerable.
- Woma (*Aspidites ramsayi*) – NC Act: Near Threatened.

- No SLC fauna species were detected within the Survey Area; however, Short-beaked Echidna (*Tachyglossus aculeatus*) is likely to be present.
- No mapped wetlands, lakes or springs occur within the Survey Area. No wetlands, lakes or springs were ground-truthed within the Survey Area.
- No mapped streams were present within the Survey Area.
- Two ESA as defined under the EP Act are present within the Survey Area. These include:
  - Category B: Endangered Regional Ecosystems – regrowth and remnant (biodiversity status).
  - Category C: Of Concern Regional Ecosystems – remnant (biodiversity status).

Project Impacts:

- There will be no impact to any TEC, ground-truthed remnant or regrowth RE, wetlands, watercourses or springs within the Disturbance Footprint or Survey Area.
- No significant residual impact is expected on any MNES and/or MSES threatened flora as none occur within the Disturbance Footprint.
- No significant residual impact is expected on any MNES and/or MSES threatened and/or SLC fauna from the proposed development as no regrowth or remnant habitat will be impacted within the Disturbance Footprint.
- No significant residual impact is expected on any ESA within the Disturbance Footprint as these will be avoided.

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8 Figures

Figures 1a-b: Representative images of WoNS recorded within the Survey Area: Common Pest Pear (*Opuntia stricta*) (left) and Velvety Tree Pear (*O. tomentosa*) (right).

Figures 2a-b: Representative images of high value regrowth RE 11.4.3 (*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains) at survey site 1039-S04 (left, right).

Figures 2c-d: Representative images of remnant RE 11.4.7 (*Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains) at survey site 1039-S05 (left, right).

Figures 2e-f: Representative images of remnant RE 11.7.1 (*Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust) at survey site 1039-S01 and 1039-S02 (left, right).

Figures 3a-b: Representative images of SLC flora within the Survey Area: Kurrajong (*Brachychiton populneus* subsp. *trilobus*) (left).

Appendix A - Location of the Survey Area and desktop ecological features

Appendix A - Location of survey area and desktop ecological features.

- Survey Area
- Cadastre

Proposed Infrastructure
- Well Centre
- Infrastructure
- Lease Pad
- Pipeline
- Proposed Camp
- Proposed Pond
- Access Track

- MSES Essential Habitat
- General Ecological Significance (GES) Wetland
- Wetland Management Trigger Areas (GES)

Protected Plants Flora Trigger
- High Risk Area

Remnant Regional Ecosystems (Biodiversity Status)
- Endangered, Dominant
- Endangered, Sub-dominant
- Of Concern, Dominant
- Of Concern, Sub-dominant
- No Concern At Present

Mature Regrowth 2012 (Biodiversity Status)
- Endangered, Dominant
- Endangered, Sub-dominant
- Of Concern, Dominant
- Of Concern, Sub-dominant
- No Concern At Present

Roads
- Local Road

Ordered Streams
- 1
- 3

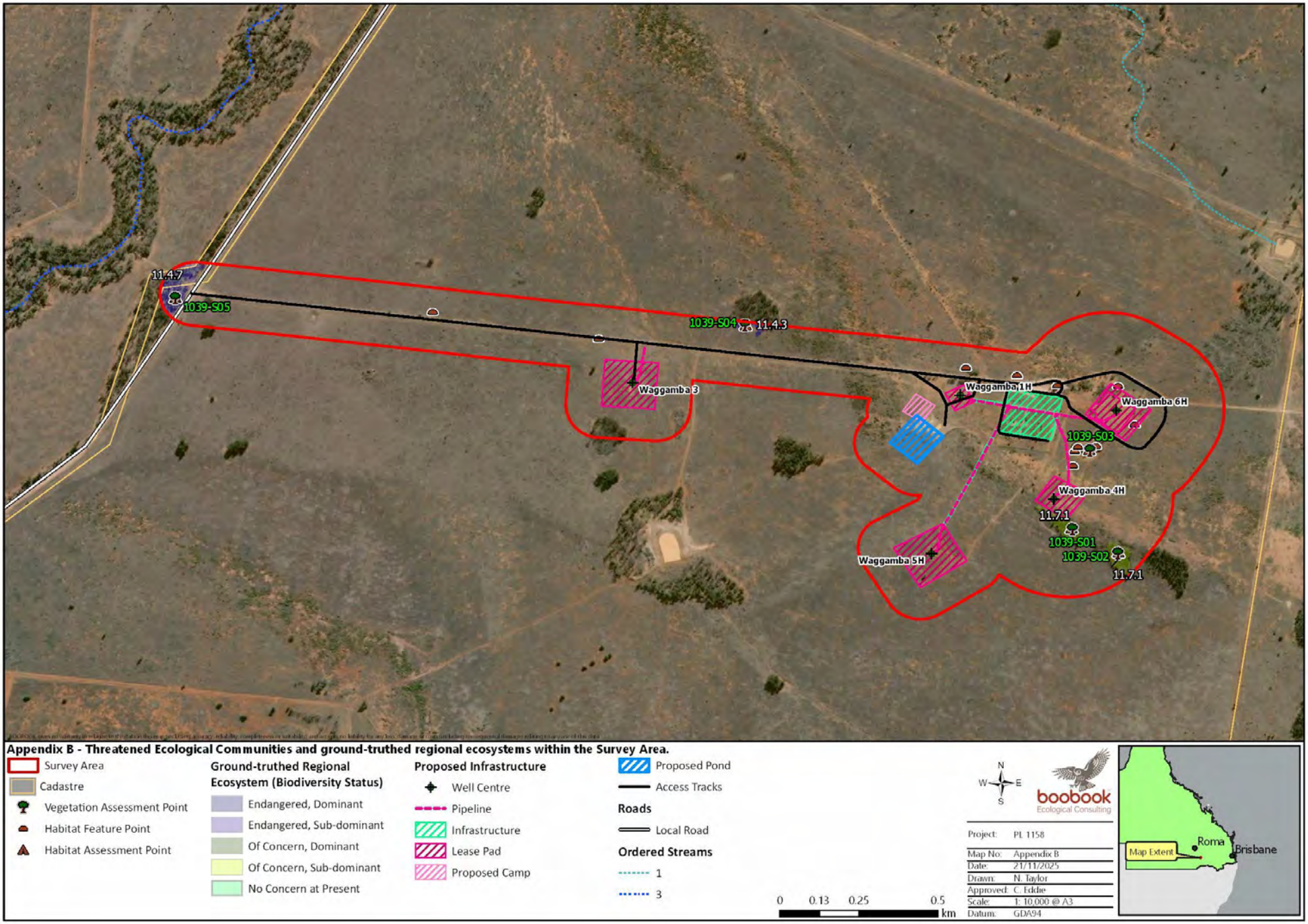
0 0.13 0.25 0.5 km

N W E S

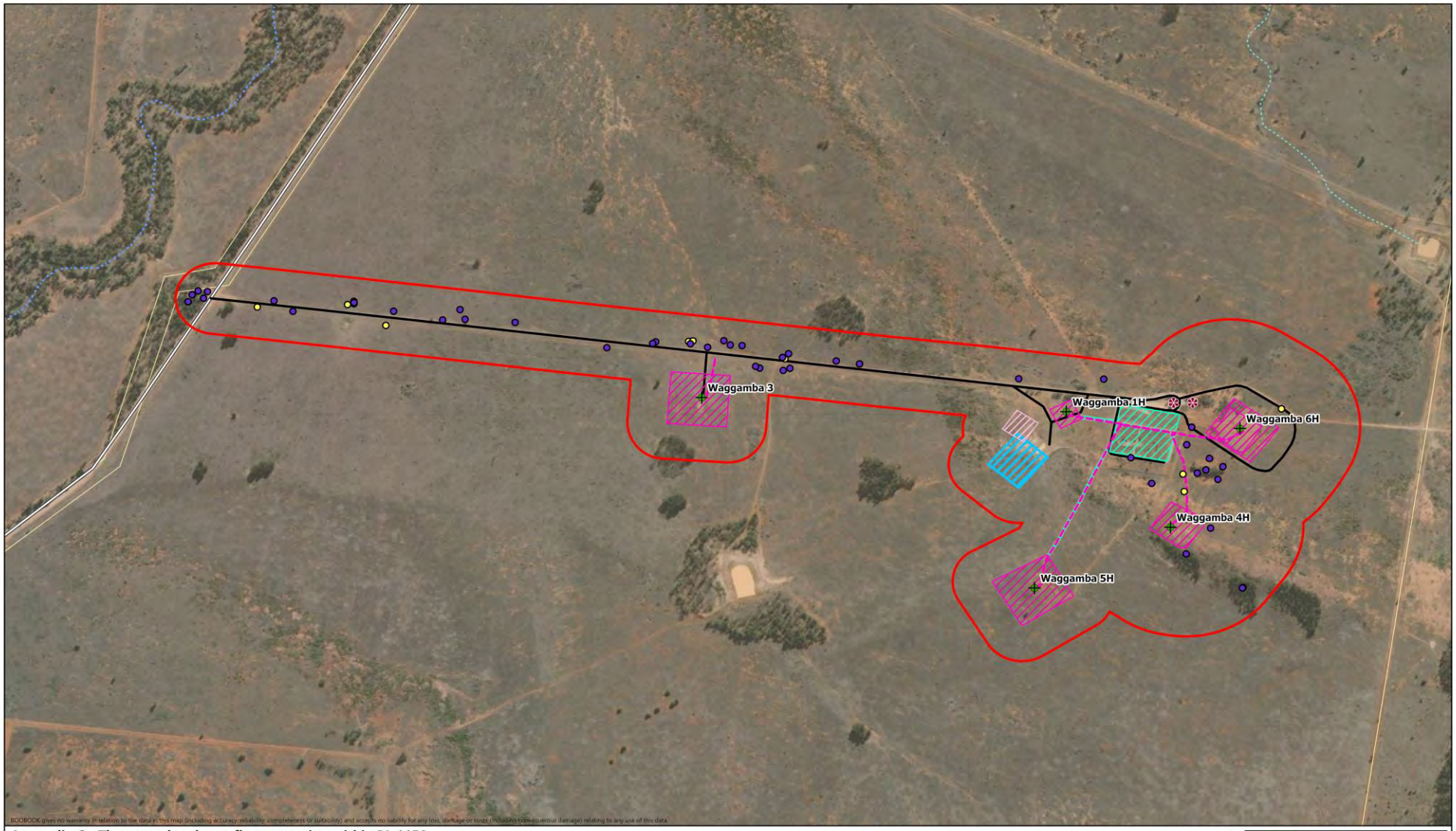
boobook Ecological Consulting

Project:	PL 1158
Map No:	Appendix A
Date:	21/11/2025
Drawn:	N. Taylor
Approved:	C. Eddie
Scale:	1: 10,000 @ A3
Datum:	GDA94

Appendix B - Threatened Ecological Communities and ground-truthed regional ecosystems occurring within the Survey Area


11.4.7
1039-S05
1039-S04
11.4.3
Waggamba 3
Waggamba 1H
Waggamba 6H
1039-S03
Waggamba 4H
11.7.1
1039-S01
1039-S02
11.7.1
Waggamba 5H
Appendix B - Threatened Ecological Communities and ground-truthed regional ecosystems within the Survey Area.
Survey Area
Cadastre
Vegetation Assessment Point
Habitat Feature Point
Habitat Assessment Point
Ground-truthed Regional Ecosystem (Biodiversity Status)
Endangered, Dominant
Endangered, Sub-dominant
Of Concern, Dominant
Of Concern, Sub-dominant
No Concern at Present
Proposed Infrastructure
Well Centre
Pipeline
Infrastructure
Lease Pad
Proposed Camp
Proposed Pond
Access Tracks
Roads
Local Road
Ordered Streams
1
3
0 0.13 0.25 0.5 km
N
W E
S
boobook
Ecological Consulting
Project: PL 1158
Map No: Appendix B
Date: 21/11/2025
Drawn: N. Taylor
Approved: C. Eddie
Scale: 1: 10,000 @ A3
Datum: GDA94
Map Extent
Roma
Brisbane

Appendix C - Threatened, pest and SLC flora within the Survey Area



Appendix C - Threatened and pest flora occurring within PL 1158.

- Survey Area
- Cadastre
- MSES Essential Habitat
- High Risk Area

WoNS and Restricted Invasive Weeds

- Common Pest Pear *(Opuntia stricta)*
- Velvety Tree Pear *(Opuntia tomentosa)*

Special Least Concern Flora

- Kurrajong *(Brachychiton populneus)*

Proposed Infrastructure October

- Well Centre
- Pipeline
- Infrastructure
- Lease Pad
- Proposed Camp
- Access Track
- Proposed Pond

Roads

- Local Road

Ordered Streams

- 1
- 3

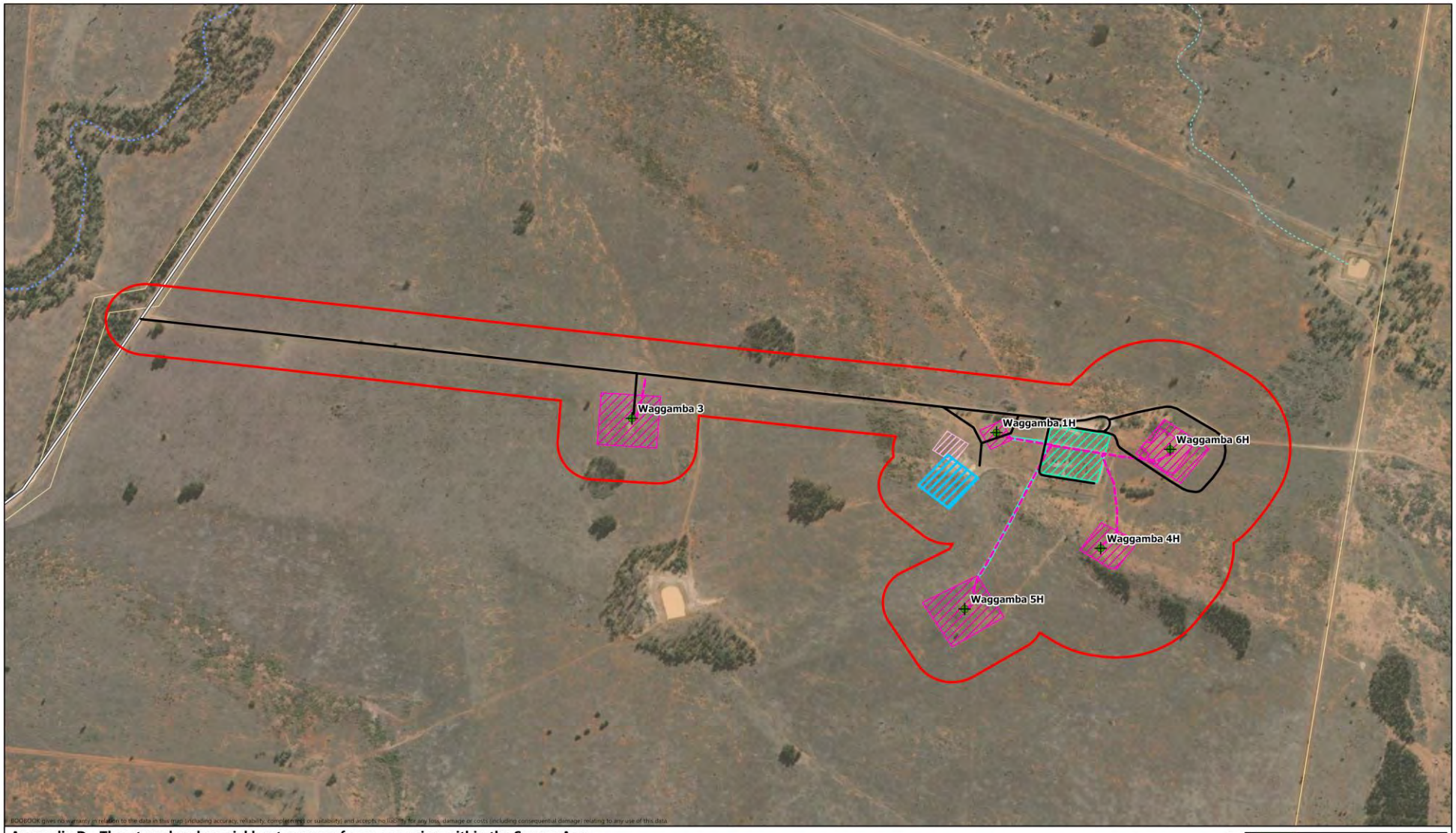
0 0.13 0.25 0.5 km

N W E S

boobook Ecological Consulting

Project:	PL 1158
Map No:	Appendix C
Date:	21/11/2025
Drawn:	N. Taylor
Approved:	C. Eddie
Scale:	1: 10,000 @ A3
Datum:	GDA94

Appendix D - Threatened, pest and SLC fauna within the Survey Area



Appendix D - Threatened and special least concern fauna occurring within the Survey Area.

- Survey Area
- Cadastre
- MSES Essential Habitat

Proposed Infrastructure

- Well Centre
- Pipeline
- Proposed Camp
- Infrastructure
- Lease Pad
- Proposed Pond
- Access Track

Ordered Streams

- 1
- 3

Roads

- Local Road

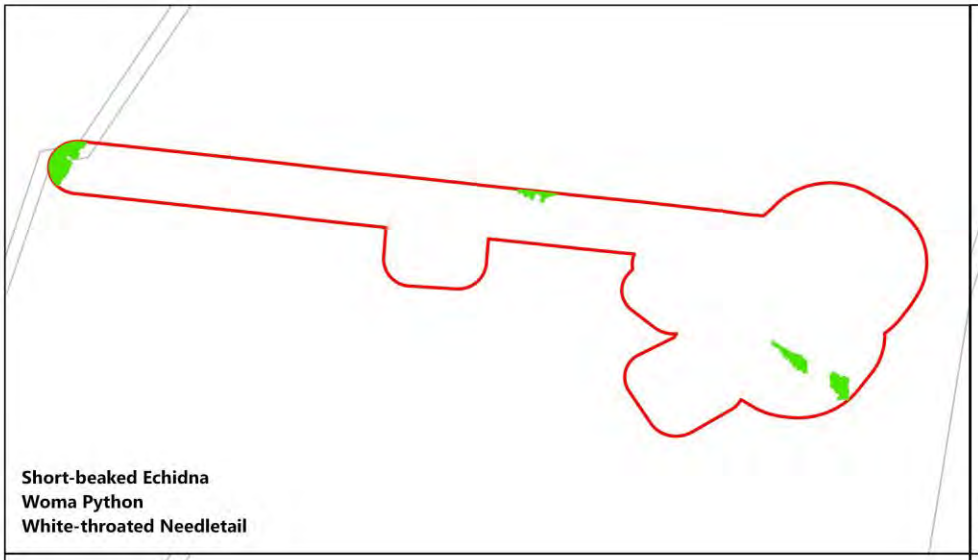
0 0.13 0.25 0.5 km

N W E S

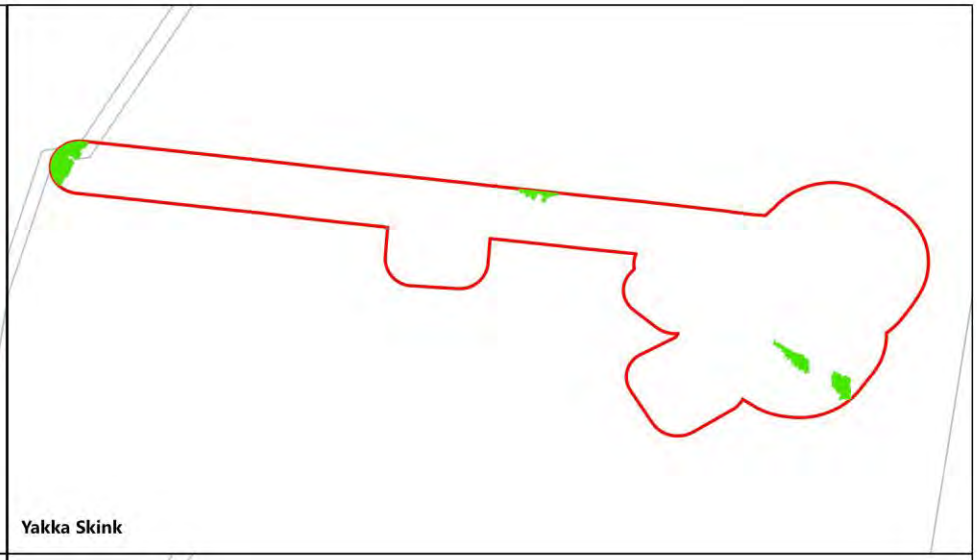
boobook Ecological Consulting

Project:	PL 1158
Map No:	Appendix D
Date:	21/11/2025
Drawn:	N. Taylor
Approved:	C. Eddie
Scale:	1: 10,000 @ A3
Datum:	GDA94

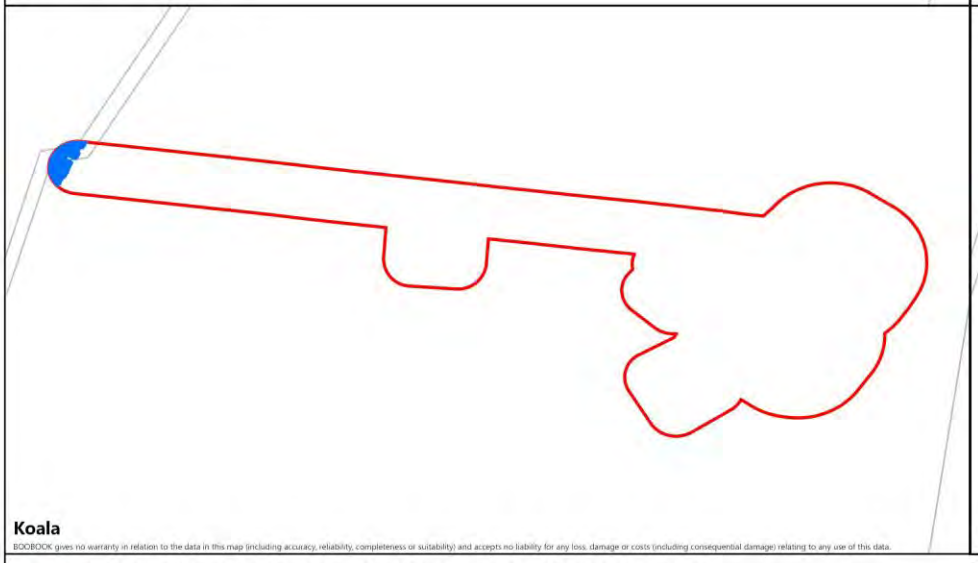
Appendix E - Predictive threatened fauna habitat mapping within the Survey Area



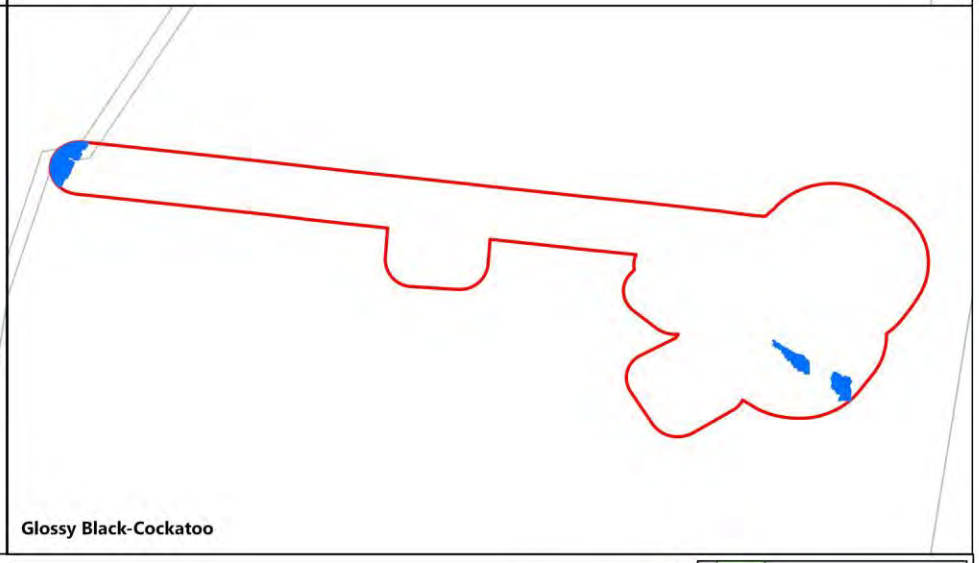
Short-beaked Echidna
Woma Python
White-throated Needletail



Yakka Skink



Koala



Glossy Black-Cockatoo

Appendix E - Predictive threatened fauna habitat mapping within the Survey Area.

- Survey Area
- Cadastre
- General Habitat
- Primary Habitat

0 0.25 0.5 1 km

N W E S

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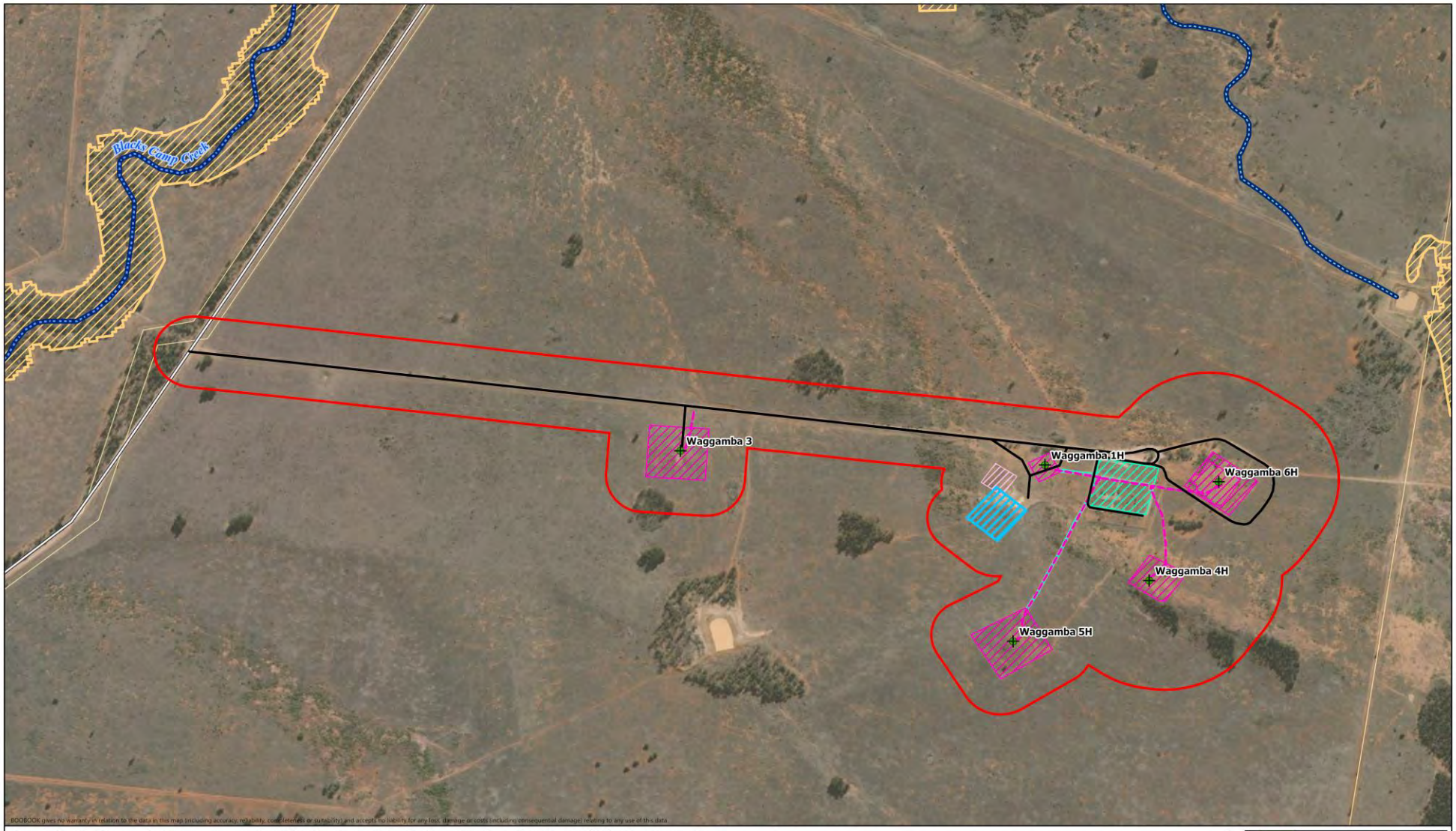
Project:	1039_OGT_SOW_PL202
Map No:	Appendix E
Date:	21/11/2025
Drawn:	A. Warren
Approved:	C. Eddie
Scale:	1: 18,000 @ A3
Datum:	GDA94

Appendix F - Mapped streams and ground-truthed wetlands and springs within the Survey Area



Appendix F - Mapped streams, mapped wetlands, ground-truthed wetlands and springs within the Survey Area.

- Survey Area
- Cadastre

QLD State Mapped Wetlands

- Wetland Areas
- Wetland Lines
- Wetland Points

Proposed Infrastructure October

- Well Centre
- Pipeline
- Infrastructure
- Lease Pad
- Proposed Camp
- Proposed Pond
- Access Track

Ordered Streams

- 1
- 3

Roads

- Local Road

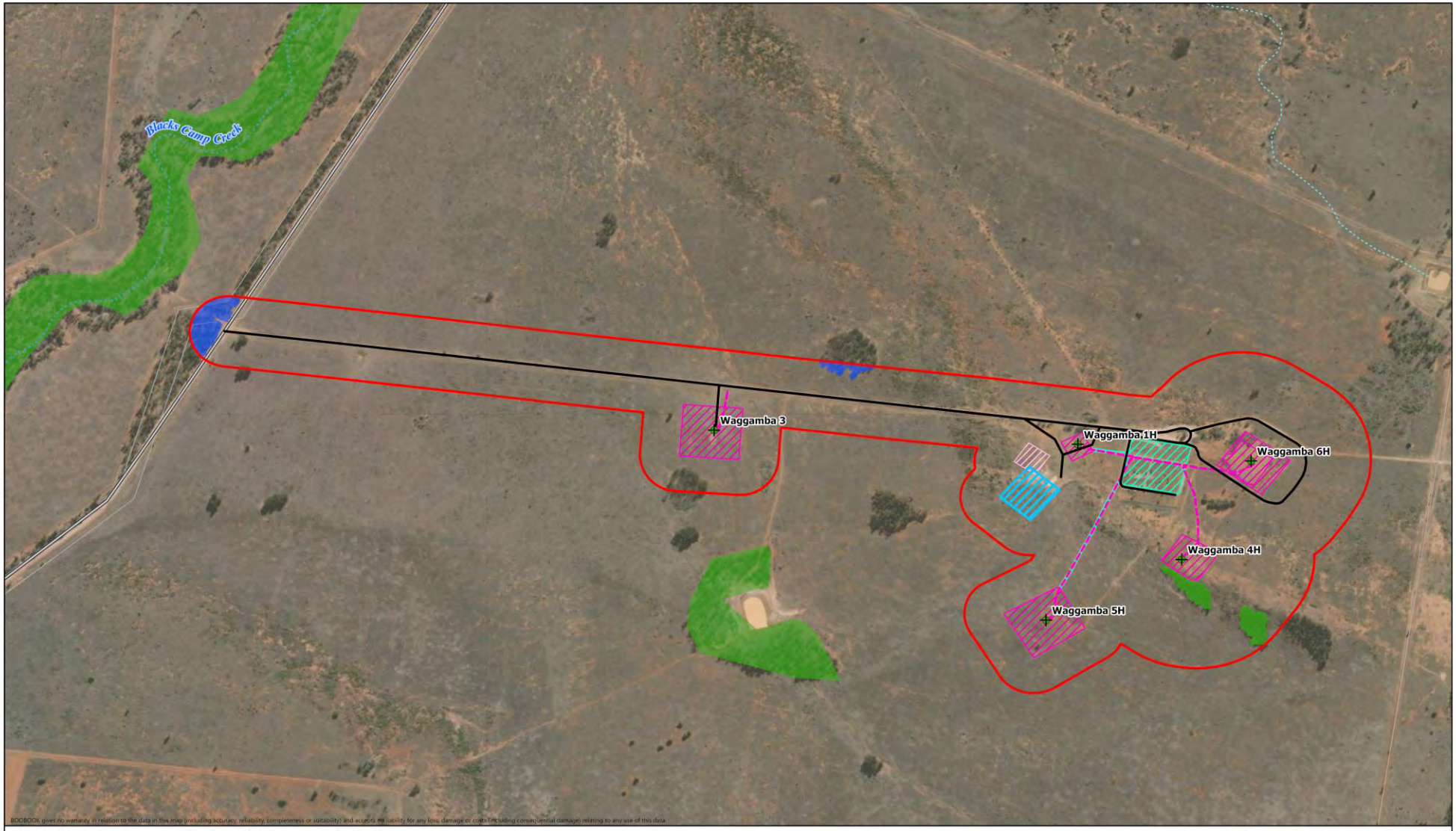
0 125 250 500 m

N W E S

boobook Ecological Consulting

Project:	PL 1158
Map No:	Appendix F
Date:	21/11/2025
Drawn:	N. Taylor
Approved:	C. Eddie
Scale:	1: 10,000 @ A3
Datum:	GDA94

Appendix G - Environmentally sensitive areas within the Survey Area



Appendix G - Environmentally Sensitive Areas within the Survey Area.

- Survey Area
- Cadastre

Roads

- Local Road

Ordered Streams

- 1
- 3

Category A

- Conservation Park
- Forest Reserve
- National Park
- Special Wildlife Reserve

Category B

- Endangered Regrowth & Remnant RE (Biodiversity Status)

Category C

- Of Concern Remnant RE (Biodiversity Status)
- Resources Reserve
- State Forest
- Timber Reserve
- MSES Essential Habitat

Proposed Infrastructure

- Well Centre
- Pipeline
- Infrastructure
- Lease Pad
- Proposed Camp
- Proposed Pond
- Access Track

0 0.13 0.25 0.5 km

N W E S

boobook Ecological Consulting

Project:	PL 1158
Map No:	Appendix G
Date:	21/11/2025
Drawn:	N. Taylor
Approved:	C. Eddie
Scale:	1: 10,000 @ A3
Datum:	GDA94

Appendix D GHG Emissions Assessment Report

OGT Energy Pty Ltd

Environmental Authority (EA) Amendment (P-EA-100227919) PL 202 (1158)

Greenhouse Gas (GHG) Assessment

Project number: V25-256

Document No: V25-256.RT1.01
Revision: 01
Date: 29 October 2025

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Document Information

Document No.	V25-256.RT1.01
Project Name	Environmental Authority (EA) Amendment PL 202 (1158) Greenhouse Gas (GHG) Assessment
Client Name	OGT Energy Pty Ltd C/O Enviro Value
Project Manager	Abhi Aitharaju

Revisions and Authorisation

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Role	Name	Position	Signature	Date Signed
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1 Introduction

An Environmental Approval (EA) (P-EA-100227919) amendment application is being lodged for the operations that are to take place at Petroleum Lease (PL) 202, which is connected to OGT Energy's Pty Ltd (OGT Energy) Silver Springs facility, located in Parknook, QLD.

As per information from the public domain[1], OGT Energy recently acquired the gas production fields at Silver Springs (SSG), Churchie Gas Fields (CGF) and the Wallumbilla Liquefied Petroleum Gas (WLPG) plant from AGL Pty. Ltd. in March 2025. These are collectively referred to as the *Surat Assets*.

PL 202 is located approximately 70 km southeast of the Surat Township and 45 km due east of the SSG and is part of the Surat Basin (**Figure 1**). Unprocessed natural gas and crude oil / condensates produced from the SSG and CGF gas fields are processed at the Wallumbilla LPG plant for delivery to Australian consumers.

The tenure for PL 202 expired on June 2, 2025. Prior to its expiry, AGL, on behalf of OGT, lodged an application for renewal on May 7, 2025. Following this application, a new tenure number, PL1158, was assigned.

It is our understanding that the EA amendment application is for incorporating Fracture Stimulation conditions into the EA for two (2) new wells and allow construction of a 1.4 ha low hazard dam to store frac water and subsequent flowback water ('the project').

ViridAU have been commissioned to conduct a Greenhose Gas (GHG) assessment in support of the EA amendment application.

Direct and indirect GHG emissions have been determined for the project in accordance with Guideline – *Greenhouse Gas Emissions Guidelines*[2], Department of Environment, Tourism, Science and Innovation (DETSI) ('GHG Guideline'), ESR/2024/6819, Version 1.01, July 2025 which are discussed below.

GHG emissions that are reported under the National Greenhouse and Energy Reporting Scheme (NGER) administered by the Clean Energy Regulator (CER) include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs).

GHG emissions from PL202 have been estimated for operational activities associated with the project only as described in Section 3 of the GHG Guideline.

To estimate GHG emissions from the project, reference has been made to methods outlined in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, Compilation No: 18 (hereafter 'the NGER Determination') – a legislative instrument under the NGER scheme.

According to the Clean Energy Regulator[3], direct (or scope 1) emissions are produced from sources within the boundary of an organisation and as a result of that organisation's activities and are calculated at the point of emission release, whereas scope 2 emissions are indirect emissions which occur outside the boundary of an organisation from the generation of electricity that is consumed by the organisation.

According to the Greenhouse Gas Protocol *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*[4] , scope 3 emissions occur from sources owned or controlled by other entities in the value chain (e.g.

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[1] *OGT Energy (https://ogtenergy.com.au/)*
[2] *GHG Guideline, July 2025 - (https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=6819&name=era-gl-greenhouse-gas-emissions.pdf)*
[3] Emissions and Energy Types – Clean Energy Regulator (*https://cer.gov.au/schemes/national-greenhouse-and-energy-reporting-scheme/about-emissions-and-energy-data/emissions-and-energy-types*), updated 28 February 2025
[4] *Corporate Value Chain (Scope 3) Accounting and Reporting Standard – Supplement to the GHG Protocol Corporate Accounting and Reporting Standard*, Greenhouse Gas Protocol

material suppliers, third-party logistic providers, waste management suppliers, travel suppliers, lessees and lessors, franchisees, retailers, employees and customers).

An overview of GHG scopes and emissions across the value chain as reproduced from the GHG Protocol is shown in **Figure 2**.

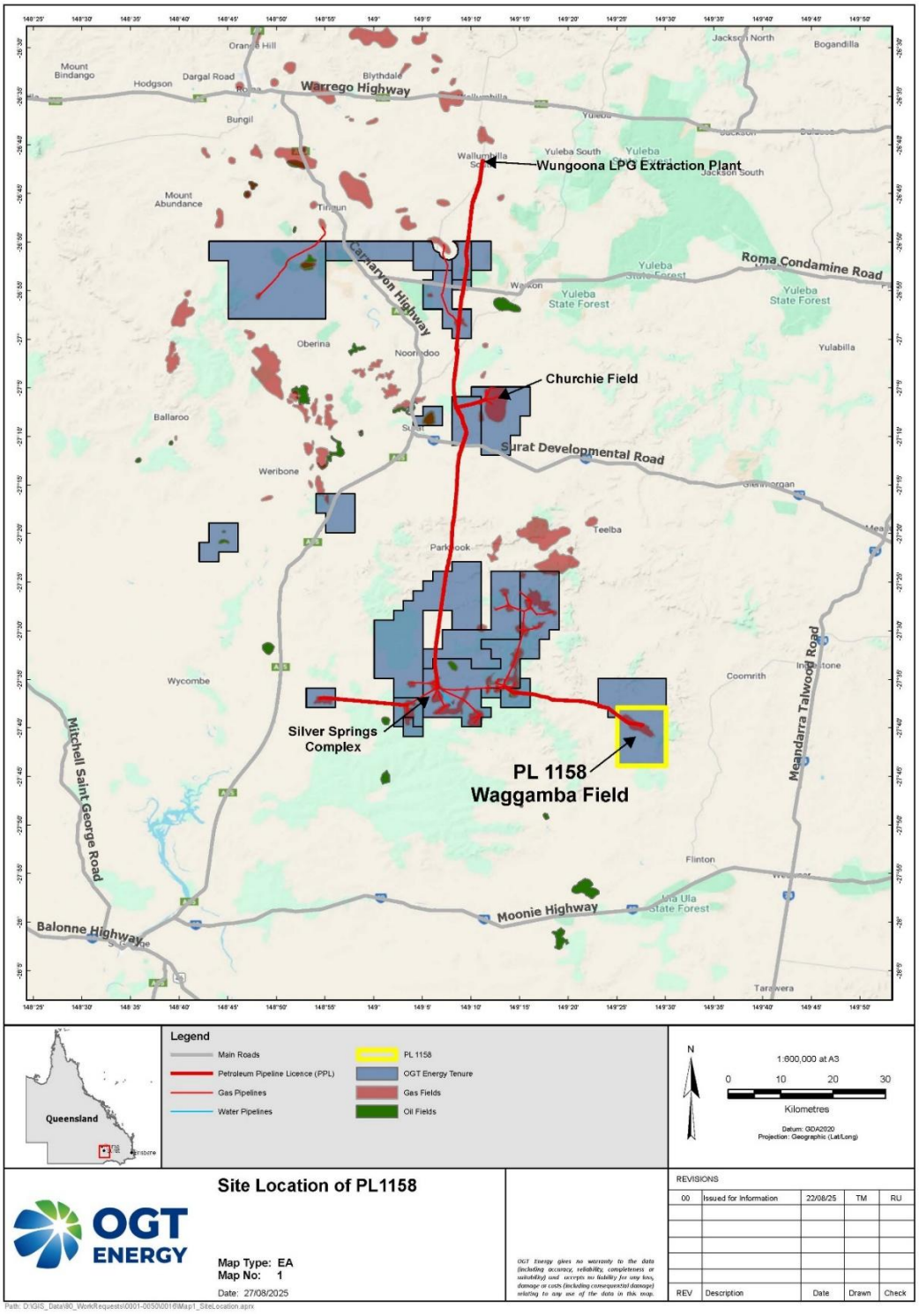

Figure 1: PL 202 (1158) in context to the Silver Springs Complex

Source: OGT Energy

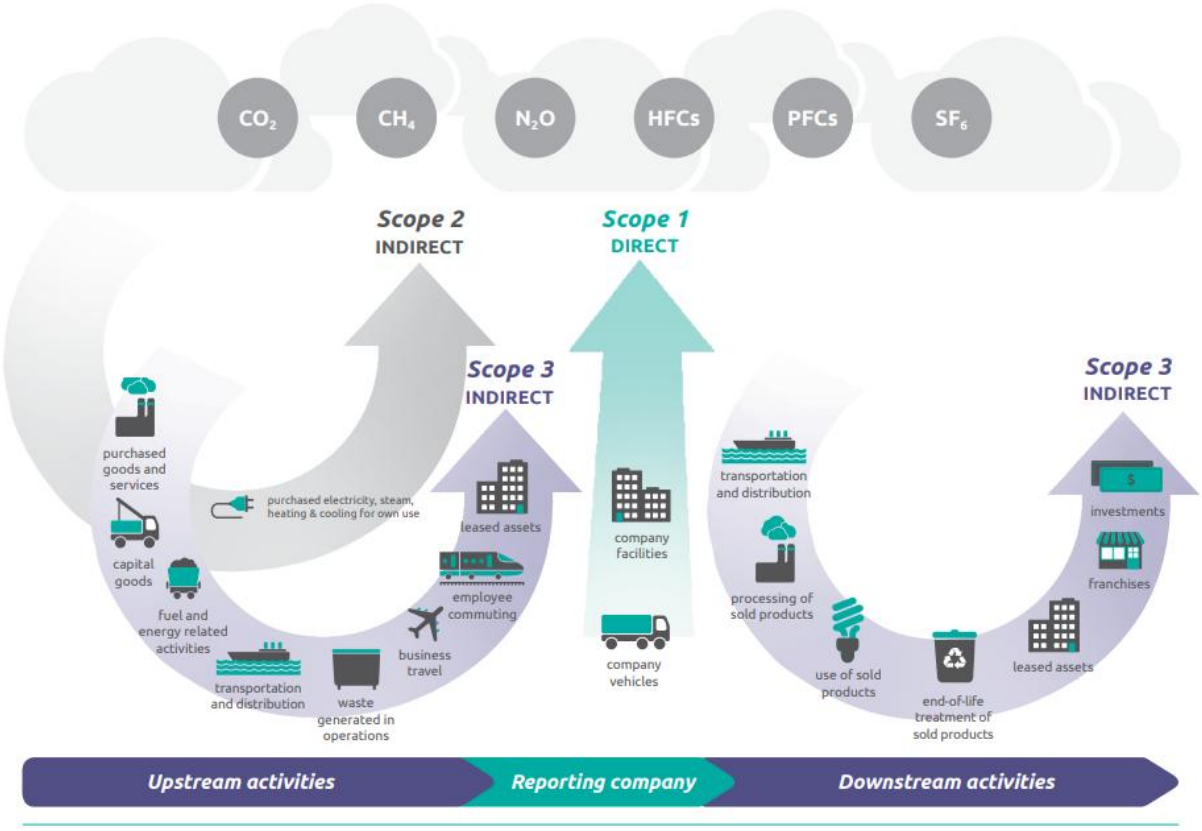

Figure 2: Overview of GHG scopes and emissions across the value chain

Source: Greenhouse Gas Protocol

2 Determination of Greenhouse Gas (GHG) Emissions

Based on reviewing the information provided, activities associated with the project that have the potential to release GHG emissions to the atmosphere are discussed below. Project related emission sources include:

- *Fuel combustion*: Emissions associated with diesel fuel combustion during
    - initial construction and drilling activities in the first year, including well completion (this includes fuel consumed for constructing the low hazard dam),
    - well workovers which are assumed to occur once every five (5) years per well for the life of the well,
    - diesel fuel consumption in stationary equipment and transport fleet for day-to-day operations across life of the project; and,
    - diesel consumed during the plug and abandonment (P&A) phase of the well.
- *Flaring emissions associated with*:
    - excess or off-spec gas flared during initial construction and drilling activities in first year; and,
    - excess or off-spec gas flared during plug and abandonment (P&A) phase of the well.
- *Venting emissions associated with*:
    - well completion with hydraulic fracturing; and
    - well workovers with hydraulic fracturing.

No electricity is expected to be consumed as part of project's activities and therefore, estimation of scope 2 emissions have been excluded from the assessment.

Direct (Scope 1) emissions have been determined as per Section 3.1 of the GHG guideline assuming a 30-year project life for each well commencing in 2026.

Methods in the NGER Determination which have been to estimate fugitive GHG emissions from the above activities are listed below

- Liquid fuel combustion – Division 2.3.2 of the NGER Determination,
- Flaring – Subdivision 3.3.2.2 of the NGER Determination,
- Venting associated with well completion with hydraulic fracturing– Subdivision 3.3.2.3.1 of the NGER Determination; and,
- Venting associated with well workover with hydraulic fracturing – Subdivision 3.3.9A.8 of NGER Determination.

Specific information useful for determination of scope 1 GHG emissions, such as energy content, densities, and gas composition is presented in **Table 1**. This information has been sourced from OGT Energy's Surat Assets.

Fuel combustion emission factors as referred from the NGER Determination for the fuels that are used on site is presented in **Table 2**.

Due to absence of site-specific information, the following assumptions have been made to estimate GHG emissions from the project's activities:

- Operational life of the project is approximately 30 years commencing in 2026,
- Diesel fuel requirements during the drilling and completion phase as well as the P&A phase of each well proposed at PL 202 have been referenced from other natural gas production and processing facilities situated in the Bowen Basin region,
- Similarly fuel consumption requirements for the day-to-day operations have been referenced from similar facilities,

- Average diesel usage during initial construction and drilling activities for the two (2) wells (combined fuel usage in stationary equipments and transport fleet) is estimated to be approximately 40 kilolitre/year (kL/year),
- Average diesel usage in stationary equipments and transport fleet for day-to-day operations at the two (2) wells is estimated to be approximately 5 kL/year,
- Average diesel usage for well-workover activity at the two (2) wells expected to occur once every 5 years (combined fuel usage stationary equipments and transport fleet) is 17 kL/year,
- Average diesel usage for plug and abandonment (P&A) phase (combined fuel usage for both stationary and transport purpose) typically at the end of project's life is 17 kL/year,
- Diesel usage has been apportioned as 80% for stationary equipment and 20% for mobile fleet,
- Well workover to occur once every five (5) years per well,
- Average volume of gas flared across the two (2) wells during initial construction and drilling and P&A phases is estimated to be approximately 5,450 m^3/year. As noted earlier, this information has been sourced from similar gas production and processing facilities.

Table 1: Energy content, density and gas composition for gas extracted from ground and sale gas

Parameter	Value	Unit	Reference
Energy content in 1m^3 of gas extracted from ground	39.30	MJ/m^3	Information sourced from OGT Energy's Surat Assets (SSG, CGF, WLPG)
Density of gas extracted from ground	0.74	kg/m^3	
Percentage of methane in gas extracted from ground	80.16	%	
Percentage of carbon dioxide in gas extracted from ground	0.24	%	

Table 2: Emissions factors used for estimating scope 1 emissions from fuel combustion

Category	Energy Content Factor (GJ/kL)	Emission Factor (kg CO_2-e/GJ)		
		CH_4	CO_2	N_2O
Diesel oil – stationary energy purpose	38.6	0.1	69.9	0.2
Diesel oil – transport energy purpose	38.6	0.1	69.9	0.4

Estimated annual scope 1 GHG emissions over the life of the project are summarised in **Table 3** and illustrated as a pie chart in **Figure 3**, expressed in t CO_2-e/year for clarity. As noted earlier, the project does not require any electricity consumption, and therefore there are no scope 2 emissions.

From the information presented in **Table 3** and **Figure 3**, the following observations can be made:

- Venting is the largest contributor of overall Scope 1 emissions, accounting for 95.0% of the total,
- Annual direct scope 1 GHG emissions across the life of the project range from 13.5 t CO_2-e/year to 2,114.9 t CO_2-e/year, averaging at 475.7 t CO_2-e/year,
- According to the Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2025[5], national GHG emissions for the year to March 2025 are estimated to be 440.2 Mt CO_2-e/year. The project's average contribution to the overall national GHG emissions is approximately 0.0001%,

[5] *Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2025*, Incorporating preliminary emissions up to June 2025, Australia's National Greenhouse Accounts, Department of Climate Change, Energy, the Environment and Water

- According to the International Energy Agency (IEA)[6], global CO_2 emissions were estimated to be 37.8 giga tonnes (Gt) in 2024. The project's average contributions to the global CO_2 emissions are very minimal and insignificant, equating to 0.000001% of the global emissions,
- Given that the proposed amendment involves only limited activities, the associated GHG emissions are expected to be minimal. Consequently, the overall GHG emissions from the two (2) new wells to be developed on PL 202 are considered negligible.

Table 3: Summary of Scope 1 emissions for the life of the project

Year	Diesel Fuel Combustion (t CO_2-e/yr)	Flaring (Gas Exploration and P&A) (t CO_2-e/yr)	Venting (Well Completion) (t CO_2-e/yr)	Venting (Well Workover) (t CO_2-e/yr)	Total Scope 1 Emissions (t CO_2-e/yr)
2026	112.5	15.2	1,987.2	-	2,114.9
2027	13.5	-	-	-	13.5
2028	13.5	-	-	-	13.5
2029	13.5	-	-	-	13.5
2030	13.5	-	-	-	13.5
2031	44.7	-	-	2,004.1	2,048.8
2032	13.5	-	-	-	13.5
2033	13.5	-	-	-	13.5
2034	13.5	-	-	-	13.5
2035	13.5	-	-	-	13.5
2036	44.7	-	-	2,004.1	2,048.8
2037	13.5	-	-	-	13.5
2038	13.5	-	-	-	13.5
2039	13.5	-	-	-	13.5
2040	13.5	-	-	-	13.5
2041	44.7	-	-	2,004.1	2,048.8
2042	13.5	-	-	-	13.5
2043	13.5	-	-	-	13.5
2044	13.5	-	-	-	13.5
2045	13.5	-	-	-	13.5
2046	44.7	-	-	2,004.1	2,048.8
2047	13.5	-	-	-	13.5
2048	13.5	-	-	-	13.5
2049	13.5	-	-	-	13.5
2050	13.5	-	-	-	13.5
2051	44.7	-	-	2,004.1	2,048.8
2052	13.5	-	-	-	13.5
2053	13.5	-	-	-	13.5
2054	13.5	-	-	-	13.5
2055	13.5	-	-	-	13.5
2056	44.7	15.2	-	2,004.1	2,064.0
Total (t CO_2-e) - life of the project					***14,748.1***

[6] *CO_2 emissions in 2024 – Executive Summary* – International Energy Agency (IEA) (https://www.iea.org/reports/global-energy-review-2025/co2-emissions)

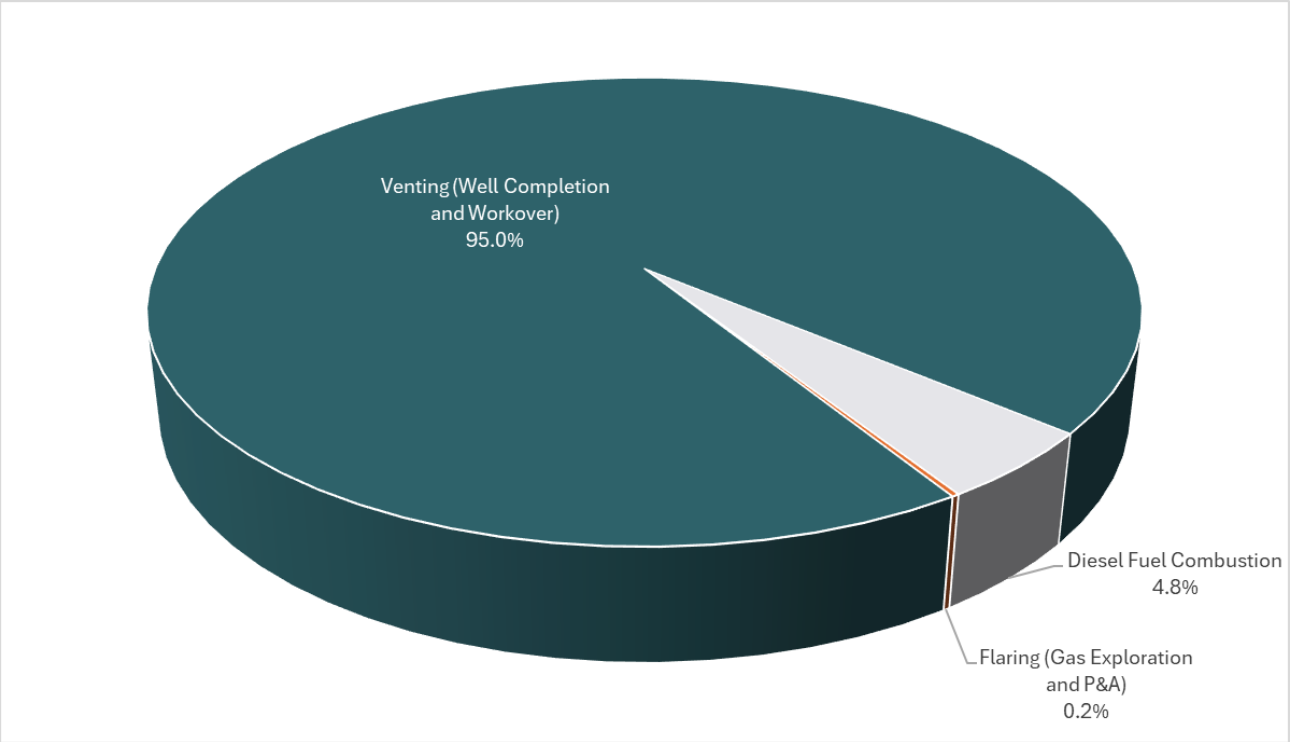

Figure 3: Breakdown of scope 1 emission sources over the life of the project

As the emissions from the two (2) wells does not emit more than 25,000 tCO_2-e per year during any year of their operational life, the project (associated amendment to the EA) is classified as a **low emitter** as per Section 3.2 of the GHG Guideline. Consequently, no additional information including quantifying upstream and downstream scope 3 GHG emissions or preparation of a GHG abatement plan is required.

2.1 GHG Emission Mitigation

Although the GHG emissions associated with the project over its lifetime are expected to be very minimal and insignificant, proactive measures will be implemented to reduce emissions over the life of the project. Measures could include – use of cleaner / lower-emission fuels, optimising operations which may result in lower fuel consumption, and minimising venting of gas wherever practicable.

3 Conclusion

Enviro Value, on behalf of OGT Energy, has commissioned ViridAU to undertake a GHG assessment to support an EA amendment application for the operations that are to take place at PL202.

The amendment seeks to incorporate Fracture Stimulation conditions into the EA for two (2) new wells and allow construction of a 1.4 ha low hazard dam to store frac water and subsequent flowback water.

GHG emissions for the life of the project (30 years) were estimated in accordance with Guideline – *Greenhouse Gas Emissions Guidelines* by DETSI.

Assessment of GHG emissions indicates that the emissions associated with the project activities are expected to be minimal considering limited activities. Consequently, the overall GHG emissions from the two (2) new wells to be developed on PL 202 are considered negligible.

4 Bibliography

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OGT Energy(2025): Plan of Operations, Plan of Operations, PL1158 (PL202), 1 Novembre 2025 to 01 June 2025, OGT Energy Pty Ltd, October 2025

Appendix E EMM Consulting Report: Groundwater and groundwater dependant ecosystems

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30 January 2026

Andrew Parker
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Re: Waggamba field - groundwater and groundwater dependent ecosystem information request

Dear Andrew,

1 Introduction

OGT Energy (OGT) has requested that EMM Consulting Pty Limited (EMM) prepare a desktop assessment to respond to items 4.1–4.3 and 5.1 of the Department of Environment, Tourism, Science and Innovation (DETSI) Information Request dated 12 January 2026 (Table 1.1). These items relate to groundwater quality, aquifer characteristics, and potential impacts on subterranean ecosystems associated with the proposed hydraulic fracture stimulation program within the Waggamba field (PL 1158) (Figure 1.1).

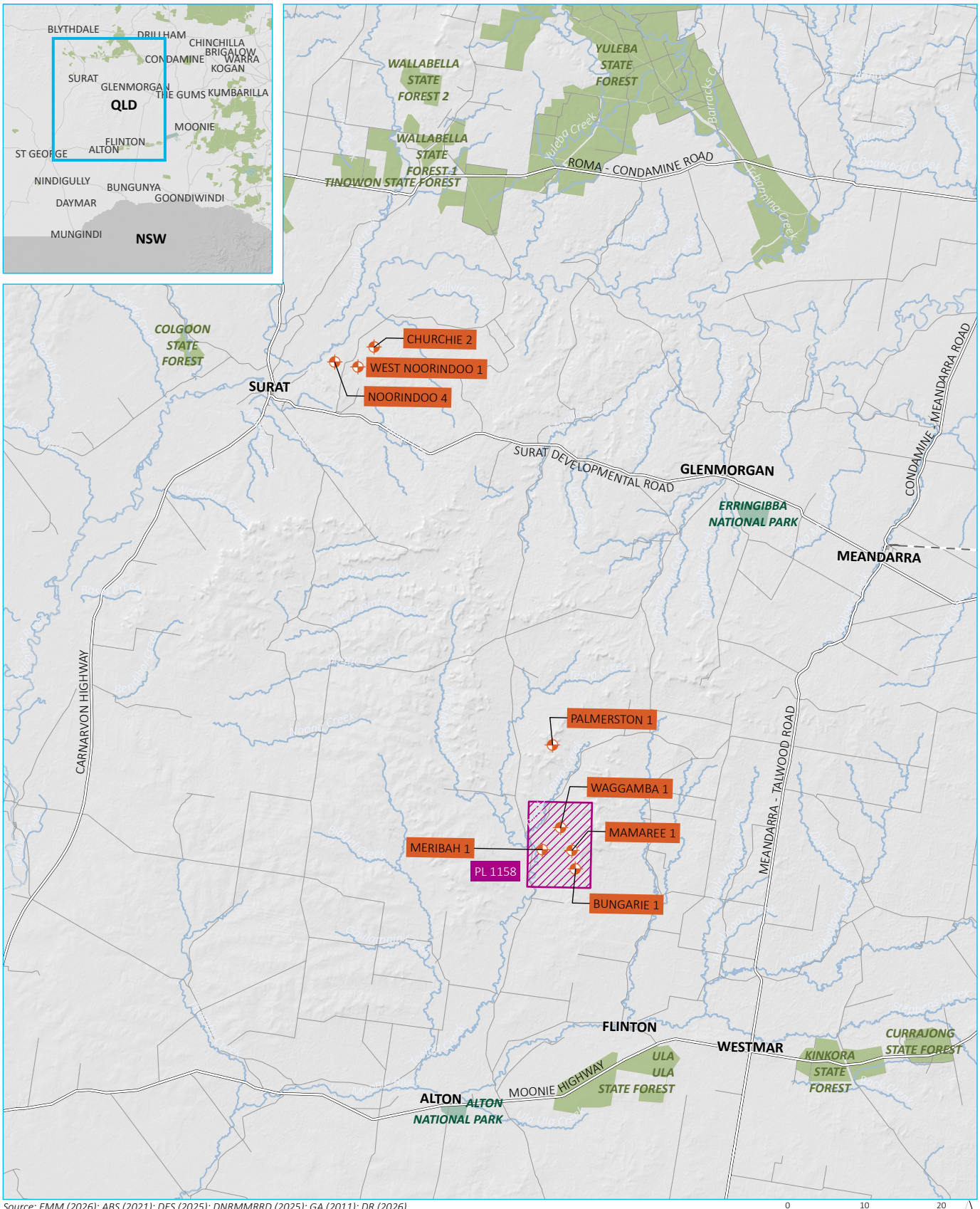
This letter report presents:

- A summary of available information on the Upper Tinowon Sandstone relevant to groundwater quality and aquifer beneficial use.
- A review of available data relating to hydraulic conductivity and groundwater residence time.
- Identification and interpretation of any accessible groundwater or produced-water quality data.
- A risk-based assessment of potential impacts on subterranean ecosystems.

This work is a desktop review informed by publicly available data and information supplied by OGT. No new field data have been collected.

Table 1.1 DETSI information request details

Item	Request
4.1	Further information/evidence is required to substantiate the claim that the Upper Tinowon Sandstone is not a beneficial aquifer.
4.2	Given the slow movement of groundwater, has any testing been conducted to determine the hydraulic conductivity or the residence time of the Upper Tinowon Sandstone? If so, please provide the results.
4.3	Has any sampling of groundwater (or produced water) been conducted? If so, please provide the results.
5.1	Provide a risk assessment of potential impact of fraccing on the subterranean ecosystem.



Source: EMM (2026); ABS (2021); DES (2025); DNRMMRRD (2025); GA (2011); DR (2026)

0 10 20 km

GDA2020 MGA Zone 55

N

\\emm.local\xdrive\2025\E251286- Waggamba well frac stim water ass\GIS\02_Maps\G001_WaggambaLocation\G001_WaggambaLocation_20260130_02.aprx 30/01/2026

KEY

- PL 1158
- Monitoring well

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody

Location map

Waggamba Field
Groundwater and Groundwater Dependent Ecosystem Information Request
Figure 1

EMM creating opportunities

2 Upper Tinowon Sandstone – beneficial use assessment (Item 4.1)

2.1 Geological and hydrogeological context

The Waggamba field (PL 1158) is situated in the Late Carboniferous – Triassic Bowen Basin succession that hosts the Permian Tinowon Sandstone gas reservoir, unconformably overlain by the southern Jurassic – Cretaceous Surat Basin. The Surat Basin is an asymmetric, gently deformed intracratonic basin composed predominantly of Jurassic–Cretaceous fluvial to marginal-marine sandstones, mudstones and coal measures. Regionally important Great Artesian Basin (GAB) aquifers present within this sequence include the Precipice Sandstone, Hutton Sandstone, Gubberamunda Sandstone, Springbok Sandstone, Mooga Sandstone and equivalents, which are laterally extensive and, regionally, provide substantial groundwater storage and flow capacity.

The Surat Basin in this region overlies the deeper Bowen Basin across a regional unconformity. Structurally, the Bowen Basin comprises a thick succession of fluvial, deltaic and coal-bearing units deposited within the broader Taroom Trough. The Waggamba field lies on the western flank of the Bowen Basin within a structurally controlled fairway associated with broad folds and subtle faulting (OGT 2025).

The Upper Tinowon Sandstone is a Permian-age sandstone unit and gas-bearing reservoir target within the Bowen Basin. The Tinowon sequence comprises a fluvio-deltaic to brackish marine succession of interbedded sandstones, siltstones, mudstones, and coal units, with surrounding mudstones acting as effective lateral and vertical seals. The sandstone is generally fine- to medium-grained, with variable carbonate cementation (Green et al. 1997).

Diagenetic processes including compaction, quartz overgrowths, carbonate cementation, illitisation, and long-term burial at elevated temperatures have substantially reduced primary porosity and permeability (Kallinowski & Gurba 2020). As a result, the Tinowon Sandstone exhibits hydraulic properties typical of deep tight-gas reservoirs, where natural permeability is insufficient to allow fluids or gas to flow to surface under ambient conditions (Johnson & Parker 2023). These characteristics underpin the requirement for fracture stimulation requirement to create permeable pathways to the well bore within the formation to enable gas production.

Consistent with its role as a deep gas reservoir, the Upper Tinowon Sandstone is not considered a water-bearing aquifer (QGC 2016). Site-specific groundwater information for the Tinowon sequence and deep Bowen Basin sediments is limited; however, regional assessments indicate that these deeper Permian units are typically fine-grained, well cemented, and characterised by very low permeability, resulting in negligible groundwater productivity (OGIA 2021).

As discussed in Section 3, available hydraulic conductivity estimates and inferred groundwater residence times indicate very low groundwater mobility. Drill stem test (DST) results from the Waggamba field and other nearby wells further confirm that all tested intervals produced gas, oil, or gas-cut fluids, with little recovery of formation-only groundwater (Table 3.2). This demonstrates negligible groundwater yield and supports the conclusion that the formation is unsuitable for stock, domestic, agricultural, or other consumptive uses.

Faulting in the region is generally subdued in the Surat Basin but more pronounced in the underlying Bowen Basin, reflecting earlier extensional and compressional tectonic phases (OGIA 2020). Available geological and hydrogeological information indicates no major fault-controlled hydraulic connectivity between the deep Permian Tinowon reservoir and the overlying Surat Basin aquifers, which are separated by thick, regionally continuous low-permeability units (including IESC 2014, OGIA 2020, and as discussed with OGT Geologist). Major thrust faults within the Bowen Basin are located on the far eastern side of the basin and are associated with the north-south trending Taroon Trough and are known to have displacements of up to 2000 m (QWC 2012a). However, these major fault zones occur on the eastern side of the Bowen Basin, whereas the Waggamba field lies on the western flank of the Basin. This structural and lithological configuration supports the conceptualisation of the Tinowon Sandstone as a deep, hydraulically isolated reservoir with no plausible connection to shallow aquifer systems or groundwater-dependent ecosystems.

2.2 Water quality and suitability for use

In addition to yield constraints, regional studies indicate that groundwater within deep Permian formations of the Bowen Basin is poor and unsuitable for beneficial use (Arrow 2014; OGIA 2021). The formations commonly exhibit elevated salinity, fluoride, and the presence of naturally occurring hydrocarbons, reflecting long groundwater residence times, limited flushing, and chemically evolved formation waters typical of deep, hydraulically isolated systems.

Limited groundwater and produced-water quality data for the site area are presented and discussed in Section 4. While interpretation is constrained by low volumes of formation water recovery and potential influence from testing and production processes, the available results consistently indicate poor water quality. Electrical conductivity (EC) values range from 10,500 to 21,200 µS/cm, with corresponding total dissolved solids (TDS) concentrations between 6,300 and 14,000 milligrams per litre (mg/L), indicating saline to brackish water. These concentrations substantially exceed the ANZG (2023) livestock drinking water guideline value for TDS (<500 mg/L). Major ion chemistry is dominated by sodium and chloride, with elevated alkalinity and bicarbonate reflecting reducing, CO_2-rich conditions typical of stagnant Permian formation brines. Within the Tinowon, naturally occurring hydrocarbons are present within the formation water (Table 4.1). Collectively, these characteristics confirm that groundwater within the Upper Tinowon Sandstone is unsuitable for potable, stock, agricultural, or other consumptive uses.

Groundwater within the shallower Surat Basin aquifers (located more than 1,000 meters (m) above the Tinowon Formation) tends to be significantly fresher than the deep Permian units. Although no site specific data are available for the Waggamba area, regional assessments show that these Great Artesian Basin aquifers typically contain moderately fresh water of sodium–bicarbonate–chloride composition, with salinities generally within the range suitable for stock use, groundwater dependent ecosystems and stygofauna (typically 500–3,000 mg/L total dissolved solids and pH 7.5–8.5) (IESC 2014). However, it should be noted that available regional datasets are inherently biased toward productive, freshwater bearing units and may not fully represent localised variability.

2.3 Beneficial use assessment summary

Available geological, hydrogeological, and water quality information indicates that the Upper Tinowon Sandstone is not a beneficial aquifer. The formation is characterised by very low permeability, negligible groundwater yields, poor water quality, and deep hydraulic isolation. Collectively, these attributes demonstrate that groundwater within the unit is unsuitable for potable, stock, agricultural, or other consumptive uses. Supporting information on hydraulic properties, inferred groundwater residence times, and groundwater quality is provided in Sections 3 and 4.

This conclusion is based on publicly available regional data, analogue studies, and site-specific drilling and testing results. While the assessment is constrained by the limited availability of site-specific hydraulic and groundwater chemistry data for the Waggamba lease, the evidence supports the interpretation that the Upper Tinowon Sandstone is highly unlikely to represent a beneficial aquifer within the region of PL 1158.

3 Hydraulic conductivity and residence time of the Tinowon (Item 4.2)

Core permeability and drill stem test results from the Waggamba gas field and other nearby wells targeting the Tinowon Formation supports the interpretation of long groundwater residence time and low hydraulic conductivity.

A review of the Tinowon Formation core test results provided by OGT indicates low permeability. Horizontal hydraulic conductivity ranged between <0.01 and 0.24 millidarcies (mD) with an average of 0.06 mD (Table 3.1). Note that 0.06 mD equates to hydraulic conductivity of around 5 x 10^{-5} meters per day (m/day) assuming standard groundwater conditions. Permeability derived from core testing represents stress-relieved matrix conditions and is not indicative of in-situ formation behaviour. In deep, tight Permian sandstones, core permeability measurements commonly overestimate true formation permeability due to stress relaxation, microfracture development, sampling bias towards cleaner intervals, and scale effects (IESC 2014). It is likely in-situ permeability is even lower than these results.

Table 3.1 Core test results – Tinowon Formation (provided by OGT)

Well	Depth of core samples (m drilled)	Horizontal hydraulic conductivity Kh (mD) – range	Horizontal hydraulic conductivity Kh (mD) – average	Number of samples with Kh results
Churchie 2	2149–2153	0.1–0.08	0.05	10
Noorindoo 4	2229–2234	0.1	0.1	4
Palmerston 1	2672–2708	<0.01–0.24	0.05	31

Notes: Well locations show in Figure 1.1.

mD = millidarcies.

Current understanding is that most of the production in the Waggamba region occurred during the 2000–2010 period; following that, the reservoir has not recharged and no (or insignificant quantities of) water has been produced, despite the pressure differential created during the previous production (M Levesque, personal communication, 21 January 2026). This provides further evidence that the target formation is contained and not significantly hydraulically connected to other water bearing zones or beneficial aquifers, indicative of low groundwater mobility and long residence times.

DST results have also been provided by OGT targeting the Tinowon unit and surrounding formations (Table 3.2). DST recovery behaviour across all wells indicates hydrocarbon-dominated, extremely low-permeability conditions with negligible formation-water mobility. The results provide no evidence of a beneficial aquifer and are consistent with long groundwater residence times.

Table 3.2 Drill Stem Test results (provided from OGT)

Well	DST #	Top (assumed to be meters drilled)	Formation	Base (assumed to be meters drilled)	Formation	Results
Palmerston 1	1	2751	Wallabella Coal	2767	Lower Tinowon	Gas to Surface 0.100 MMcf/d (cased hole test)
Waggamba 1	4	2595	Tinowon	2621	Tinowon Sands	189 m oil, 152 m water, 311 m watery mud
Mamaree 1	7	8564	Wallabella Sand	8607	Wallabella Sand	recovered 200' rathole mud, 500' gas cut fresh water
Bungarie 1	2	2595	Tinowon	2625	Wallabella Sand	Gas to surface too small to measure, 35 m slight gas cut water
Meribah 1	3	8129	Tinowon	8339	Wallabella Sand	Gas to surface too small to measure, 273' gas cut mud

Notes: Well locations show in Figure 1.1.

MMcf/d = million cubic feet per day.

For comparison, published permeability/hydraulic conductivity values for Permian formations in the Bowen Basin are included in Table 3.3. The permeability results reported in Table 3.1 for the Tinowon Formation are similar and at the low end of the ranges reported from other Permian formations in the Bowen Basin.

Most Bowen Basin Permian sandstones have permeabilities in the sub-millidarcy to few millidarcies range, or hydraulic conductivities well under 0.1 m/day. The highest values (hundreds to thousands of mD) typically correspond to either exceptional reservoir sections or possibly measurement artifacts/uncertainties. By contrast, typical regional values for units like the Bandanna and Cattle Creek Formations are on the order of <0.075 m/day, confirming generally aquitard-like characteristics. There are no identified laterally extensive, highly permeable aquifers within the Bowen Basin Permian sequence below the Bandanna Formation (QWC 2012); instead these rocks generally yield little water and have high storativity (water largely bound in the matrix).

The published data consistently demonstrates that Permian sandstones of the Bowen Basin are of very low permeability, which is why they require hydraulic stimulation to produce gas at economic rates. From a groundwater-impact perspective, this means these formations do not readily transmit water under natural conditions. The low hydraulic conductivities (typically <0.075 m/day) imply that groundwater flow is extremely slow under natural gradients.

For reference, compared to the very low-permeability Permian sandstones of the Bowen Basin, the major productive GAB beneficial aquifers within the younger Surat Basin have significantly higher permeability, often one to three orders of magnitude greater. For example, the Jurassic Hutton Sandstone has median horizontal hydraulic conductivity of about 0.5 m/day and mean horizontal permeability of approximately 450 mD (IESC 2014).

Table 3.3 Regional hydraulic conductivity/permeability values of other Permian formations of the Bowen Basin

Formation	Reported hydraulic conductivity/permeability	Method/source	Comment
Aldebaran Sandstone (Lower Permian, Denison Trough	~0.0008–1.6 m/day (1–2,000 mD)	Wang et al. (2023) – core analysis and well tests in a depleted gas field	Tight gas reservoir. Higher values likely reflect fractured or coarser facies.
Bandanna Formation (Upper Permian, southern Bowen Basin	0.0001 – 0.075 m/day (~0.1–90 mD)	OGIA (2019) – compilation of numerous pumping tests & DSTs	Coal-bearing sandstone aquifer. Low K values indicate slow groundwater flow. Although there are areas regionally in the basin where the Bandanna does produce water (and gas) and is considered an aquifer.
Cattle Creek Formation (Lower Permian, southern Bowen Basin)	0.0001–0.075 m/day (~0.1–90 mD)	OGIA (2019) – compilation of numerous pumping tests & DSTs	Similar range to Bandanna. Often considered part of the low-permeability basement.
Permian Coal Measures (e.g. Moranbah Coal Measures)	1.7×10^{-6} to 4.1×10^{-8} m/s (~4.2–176 mD)	In-situ packer tests (Klenowski & Bernal 2021)	Represents tight matrix permeability. Very limited natural groundwater flow. Lithology includes coal formations.
(Comparison) Rewan Formation (Lower Triassic)	0.00005–0.031 m/day (~0.06 – 37 mD)	OGIA (2019)	Regional aquitard above Permian units. Similar low K values.

Notes: Conversion to mD assumes water at ambient room temperature and a unit hydraulic gradient (i=1).

4 Groundwater or produced water sampling (Item 4.3)

As described above there is limited groundwater available for sampling, therefore OGT has provided the available groundwater/produced-water quality results from three wells that intersect the Tinowon Sandstone: Waggamba 1, West Noorindoo 1, and Noorindoo 1 (Table 4.1). The water quality analysis for Waggamba 1 was derived from the water produced during drill stem testing following well completion in 1981; the West Noorindoo 1 data was derived from sampling of produced water post fracture stimulation in 2025; Noorindoo 1 data was derived from a produced water sample taken from the separator during production.

These data represent the best available local evidence of groundwater quality within the target formation.

The representative formation water sample from Waggamba 1 shows a Na–Cl dominated brackish water typical of deep, over-pressured Permian sandstones. The chemistry suggests long residence times, minimal groundwater movement, and a reducing, CO_2-rich environment consistent with stagnant formation brines in tight gas systems. The composition indicates no potential for beneficial use and hydraulic isolation from shallow aquifers or ecosystems. Some characteristics may be influenced by the DST process, including partial interval flushing and mud contamination, and should be interpreted with this in mind.

The post-fracture stimulation water sample from West Noorindoo 1 reflects a significantly more saline Na–Cl brine with elevated divalent cations and sulphate, indicating strong water–rock interaction and possible contact with evaporitic or sulfate-bearing minerals within the Permian sequence. The chemistry is consistent with an older, more evolved formation brine and shows no indication of groundwater beneficial use or connection to shallower systems. However, the influence of fracturing fluids, enhanced mineral dissolution and flowback mixing means the sample may not represent uncontaminated formation water.

The separator water sample from Noorindoo 1 exhibits a moderately saline Na–Cl brine with a chemistry broadly consistent with deep Permian groundwater, including elevated chloride, sodium, and bicarbonate. The ionic composition indicates long residence times and low permeability, with characteristics intermediate between the CO_2-rich brine at Waggamba 1 and the more evaporite-influenced brine at West Noorindoo 1. The water is unsuitable for any beneficial use and reflects limited hydraulic connectivity with shallow systems. Because the sample was collected during production, it may be affected by mixing processes, operational fluids, or variable production conditions.

Together, the three water samples reflect chemically distinct but consistently saline, low-mobility formation groundwater characteristic of deep, compartmentalised Permian sandstones, with differences potentially attributable to both natural geochemical variability and the sampling methods used.

Table 4.1 Water quality analyses (provided by OGT)

	Waggamba 1 (sample 225)	West Noorindoo 1	Noorindoo 1
Sample type	DST return (DST #3)	Post fracture stimulation, sampled soon after 100% of frac return	Separator water
Target formation	Tinowon	Tinowon	Tinowon
Date	13 November 1981	4 November 2025	21 January 2008
EC (µS/cm)	10,500	21,200	11,200
pH	8.5	7.46	7.8
TDS (mg/L)	6,300	14,000	8,150
Hardness – Ca + Mg as $CaCO_3$ (mg/L)	70	868	208
Alkalinity – as $CaCO_3$ (mg/L)	1,700	516	740
Free Carbon Dioxide – as CO_2	6	36	na
Sodium (mg/L)	2,520	3,580	2,690
Potassium (mg/L)	24	1,160	434
Calcium (mg/L)	24	280	71
Magnesium (mg/L)	2.5	41	7
Bicarbonate (mg/L)	1,920	516	740
Carbonate (mg/L)	75	<1	<1.0
Chloride (mg/L)	2,700	7,160	4,290
Fluoride (mg/L)	1.1	1.2	<1.0
Nitrate (mg/L)	2	0.92	na

	Waggamba 1 (sample 225)	West Noorindoo 1	Noorindoo 1
Sulfate (mg/L)	12	146	209
TRH >C10-C40 (sum) (mg/L)	na	1,510	na

Notes: na – not analysed.

Well locations show in Figure 1.1.

TRH – total recoverable hydrocarbons

5 Subterranean ecosystem risk assessment (Item 5.1)

5.1 Context and approach

A semi-quantitative risk assessment has been undertaken to evaluate the potential impacts of fracture stimulation fluids on subterranean ecosystems. The assessment is informed by published scientific literature, regional geological and hydrogeological characteristics, and a conceptual understanding of deep aquifer ecosystems. The assessment focuses on identifying credible ecological receptors and exposure pathways relevant to the proposed activities.

Subterranean ecosystems comprise multiple biological components, including groundwater dependent ecosystems (GDEs), stygofauna (aquatic invertebrates inhabiting groundwater), and microbial communities. For the purposes of this impact assessment, stygofauna are the primary ecological focus, reflecting their recognised sensitivity to groundwater disturbance, their relevance as biological indicators of aquifer ecosystem condition, and the ongoing uncertainty regarding their distribution, habitat requirements, and responses to changes in groundwater chemistry. This approach aligns with national guidance, which notes that although microbial communities play critical functional roles, it is not currently practical to undertake a comprehensive census of aquifer microbial assemblages for routine environmental impact assessment and therefore recommends a pragmatic reliance on stygofauna as the key biotic indicator of aquifer ecosystem condition (Doody et al. 2019).

Microbial communities are known to be ubiquitous across subsurface environments, including in deep, confined geological formations, and their composition and function are generally poorly characterised at site scale (Beaver and Neufeld 2024). Anaerobic microbial assemblages are expected to naturally occur in formations such as the Upper Tinowon Sandstone, reflecting the elevated temperature, pressure, and reducing conditions typical of hydrocarbon-bearing systems. Studies of analogous deep tight-gas reservoirs (e.g. Daly et al. 2016; Mouser et al. 2016) have shown that microbial communities in such environments are typically low in diversity and are dominated by halotolerant, anaerobic taxa (e.g. Halanaerobium, methanogenic archaea), with activity largely constrained by extreme salinity, temperature, and nutrient limitation.

Although subsurface microbial assemblages may respond to changes in groundwater chemistry associated with resource development activities, there is currently no established regulatory framework, threshold criteria, or endorsed methodology for assessing impacts to deep microbial communities as discrete ecological receptors. Contemporary regulatory guidance instead treats microbes as an intrinsic component of the broader aquifer ecosystem, to be considered indirectly through hydrological and hydrochemical indicators and through the presence and condition of stygofauna. This approach is consistent with national guidance (Doody et al. 2019) and aligns with the Independent Expert Scientific Committee's (IESC) position that microbial communities in deep aquifers are best addressed through indirect indicators and risk-based reasoning.

Given their ubiquity, the absence of defined protection targets, the lack of practical assessment methods, and the limited ecological significance of microbial compositional shifts at depth, the presence or alteration of deep microbial communities does not constitute an impact to a GDE of environmental significance. Consequently, microbial communities are addressed implicitly within this assessment, rather than as a separate receptor in the risk evaluation. Nonetheless, OGT may consider microbial monitoring in future stages of the project (e.g. during flowback water characterisation), and review the need for targeted microbial assessment should new guidance or site-specific data become available.

5.2 Risk assessment

5.2.1 Likelihood of subterranean ecosystem occurrence

The likelihood of stygofauna occurrence within deep Permian tight-gas formations is generally considered to be very low to negligible due to the combined effects of depth, elevated temperatures, limited hydraulic connectivity, anoxic conditions, and unsuitable aquifer characteristics. These conditions are inconsistent with the habitat requirements of stygofauna, which are typically restricted to shallower, oxygenated, and hydraulically connected groundwater systems. A qualitative assessment of key habitat suitability parameters for the Upper Tinowon Sandstone, using data discussed in Sections 2–4, is provided in Table 5.1.

In contrast to stygofauna, microbial communities are expected to occur ubiquitously across subsurface environments, including within the Upper Tinowon Sandstone. These communities are typically composed of anaerobic, halotolerant, and thermophilic taxa adapted to the extreme conditions of deep, confined formations. However, due to the absence of defined ecological protection targets, the lack of practical baseline assessment methods, and the limited ecological significance of compositional shifts at such depths, these microbial assemblages are not considered discrete ecological receptors for the purposes of this risk assessment. Their presence is acknowledged; however, due to the absence of defined protection targets and practical assessment methods, and given the predicted confinement of stimulation-related changes to the target interval, potential microbial responses are not expected to result in ecologically significant impacts.

Table 5.1 Assessment of subterranian ecosystem habitat suitability within the Tinowon Formation

Habitat suitability criterion	Literature basis	Upper Tinowon Sandstone characteristics likely in PL 1158	Implication for stygofauna presence
Depth to habitat	Hose et al. (2015), Datry et al. (2005), DES (2018), Rees et al. (2020), Glanville et al. (2016), Koch et al. (2024)	Proposed fracturing interval at ~2,675 mbgl (OGT 2025).	Negligible likelihood – stygofauna are overwhelmingly reported at depths <100 m, with rare occurrences to ~300 m; depths >1,000 m are considered outside known viable habitat ranges. No known records of stygofauna inhabiting deep, over-pressured formations such as the Permian Tinowon Sandstone (~2,600–2,700 mbgl).
Hydraulic connectivity to recharge, surface water or shallow aquifers	Humphreys (2000), Hancock et al. (2005), Hancock and Boulton (2008), Hose et al. (2015)	No hydraulic connection to alluvial aquifers or surface water; no identified fault or fracture pathways; negligible recharge since ≥ 2010.	Negligible likelihood – isolation from recharge and surface systems limits colonisation and long-term persistence.
Dissolved oxygen (DO)	Mosslacher (1998, 2000), Hose et al. (2015)	Not measured; inferred to be anoxic based on depth, confinement, hydrocarbon presence, redox-sensitive ions (very low nitrate and sulfate) (Table 4.1).	Negligible likelihood – stygofauna are obligate aerobes that require dissolved oxygen for survival. Although they are adapted to tolerate low-oxygen (hypoxic) environments, they cannot persist under permanently anoxic conditions.

Habitat suitability criterion	Literature basis	Upper Tinowon Sandstone characteristics likely in PL 1158	Implication for stygofauna presence
Electrical conductivity (EC)	Hose et al. (2015), Glanville et al. (2016)	10,500 µS/cm (Table 4.1)	Low likelihood – exceeds commonly reported preferred range (<5,000 µS/cm); values near or above tolerance limits. Although occurrences have been documented up to ~55,000 µS/cm.
pH	Hose et al. (2015), Hancock and Boulton (2008); Glanville et al. (2016)	8.5 pH (Table 4.1)	Moderate tolerance but low likelihood overall – pH alone is not limiting.
Temperature	Queensland Government (2026), Hose et al. (2015), Glanville et al. (2016)	87 °C (OGT 2025)	Negligible likelihood – far exceeds known thermal tolerance of stygofauna (<30–35°C).
Total dissolved solids (TDS)	Hose et al. (2015), SLR (2022)	6,300 mg/L (Table 4.1)	Low likelihood – above typical preferred range (500–3,000 mg/L), approaching upper tolerance.
Aquifer type/pore structure	Hose et al. (2015)	Tight sandstone; low primary porosity; fracture-poor	Very low likelihood – stygofauna preferentially occur in alluvial, karstic or well-fractured aquifers.
Hydraulic conductivity (K)	Hose et al. (2015)	0.05–0.1 mD (~5 x 10^{-4} m/day) or lower (Table 3.1)	Low likelihood – at or below lower threshold for sustaining stygofauna movement and habitat.

Notes: mbgl = meters below ground level.

5.2.2 Conceptual model and pathways for impact

Potential pathways for the migration of fluids, gas, or pressure changes from the Upper Tinowon Sandstone to overlying aquifers (and adjacent units) have been assessed considering both geological and anthropogenic pathways, the likelihood of connectivity, and the hydrogeological characteristics of the formation. These pathways and outcomes are summarised in Table 5.2 and are shown conceptually and schematically (not to scale) in Figure 5.1, with the following features highlighted:

- The Surat Basin is a geological basin, and forms part of the GAB (IESC 2014). The main aquifers within the Suart Basin are the Precipice Sandstone, Hutton Sandstone, Gubberamunda Sandstone, Mooga Sandstone, Bungil Formation and their equivalents. These aquifers are generally laterally continuous, have significant groundwater storage and permeability and are extensively developed for groundwater use (OGIA 2021).
- Within PL 1158 the following regionally significant GAB aquifers were identified, along with their depths (OGT 2025):
    - Mooga Sandstone (649.9 mbgl).
    - Gubberamunda Sandstone (901.3 mbgl).
    - Springbok Sandstone (1,193.6 mbgl).
    - Hutton Sandstone (1,4950.5 mbgl).
    - Boxvale Sandstone member, which forms part of the Evergreen Formation (1,727.7 mbgl).

(For reference, regionally significant formations are shown in Figure 5.1 that are not necessarily present within PL 1158).

- Surat Basin aquifers are more likely to support stygofauna habitat due to the shallower depths, higher permeability and fresher groundwater. The likelihood of occurrence reduces with depth. Globally, stygofauna are documented to occur at depths shallower than 300 mbgl (e.g. Hose et al. (2015), Datry et al. (2005), DES (2018), Rees et al. (2020), Glanville et al. (2016), Koch et al. (2024)).
- The Bowen Basin is comprised of Permian to Middle Triassic clastic sediments, limestone, andesite, basalt and coal (IESC 2014) and unconformably lies below the Surat Basin.
- The Tinowon Sandstone is the target for hydraulic fracturing within the deeper Bowen Basin sediments and is > 2,500 mbgl in PL 1158. Two-dimensional modelling undertaken for the project suggests total horizontal fracture length may extend up to 1,600 m from the well and good conductivity and connection may only be achieved to around 300 to 400 m from the reservoir to the wellbore (OGT 2025). Due to the presence of siltstone and interbedded coal units immediately above perforated zones, very little vertical fracture growth outside the immediate Upper Tinowon Sandstone is expected (OGT 2025).
- There is limited documented data on fault systems within PL 1158 intersecting the target formation. OGT reports that there are no major fault systems or mapped faults within the immediate area of the target reservoir (M Levesque, personal communication, 21 January 2026). Any influence of the fault structures on regional groundwater flow, either as pathways or barriers, is likely to be restricted to the Bowen Basin, where there is the most offset, and is unlikely to materially influence the majority of the overlying GAB aquifers in the Surat Basin (IESC 2014). It is noted that the deepest GAB aquifer, being the Boxvale Sandstone member, is nearly 1000 m shallower than the targeted Tinowon Sandstone, making fault connection highly improbable.

Although fracture stimulation fluids may locally alter physical or chemical conditions within the stimulated interval, modelling predicts these effects would be confined to the targeted Permian tight-gas formation (OGT 2025). In this geological setting, there is no credible hydraulic or ecological pathway linking the deep Tinowon Sandstone to groundwater-dependent ecosystems, stygofauna habitat, or other sensitive subterranean biota. The substantial depth of the reservoir, its low matrix permeability, the presence of thick confining units, and the absence of vertical connectivity collectively prevent interaction between stimulation fluids and shallow subterranean ecosystems. Accordingly, despite the intrinsic sensitivity of these ecosystems, the likelihood of any ecological impact is considered negligible.

Table 5.2 Assessment of pathways for impacts to shallower aquifers

Event/ pathway	Description	Target formation attributes	Implication of potential pathway
P1	Migration along conductive faults- preferential pathways.	No mapped major faults intersecting the target interval; formation isolated from shallow aquifers.	Negligible likelihood – no natural structural connectivity to allow upward migration.
P2	Cross fault leakage through juxtaposition.	Minimal juxtaposition; confining units above and below sandstone; no active faults.	Negligible likelihood – low permeability confining layers prevent significant flow.
P3	Migration through rock matrix-diffuse flow.	Tight, low-porosity sandstone; permeability of ~0.05–0.1 mD (or ~ 5 x 10^{-4} m/day) or lower (Table 3.1).	Negligible likelihood – slow matrix flow limits fluid migration over relevant timescales.

Event/ pathway	Description	Target formation attributes	Implication of potential pathway
P4	Well integrity failure - causing migration of gas, hydrocarbons, fluids or depressurisation.	Wells cased and cemented; integrity managed under regulatory conditions.	Low likelihood - engineered pathway controlled.
P5	Increased vertical permeability caused by hydraulic fracturing method.	Low matrix permeability; fractures are confined to stimulated interval (OGT 2025); overlying units confining.	Negligible likelihood – fracture stimulation is contained; no vertical connection to shallow aquifers.

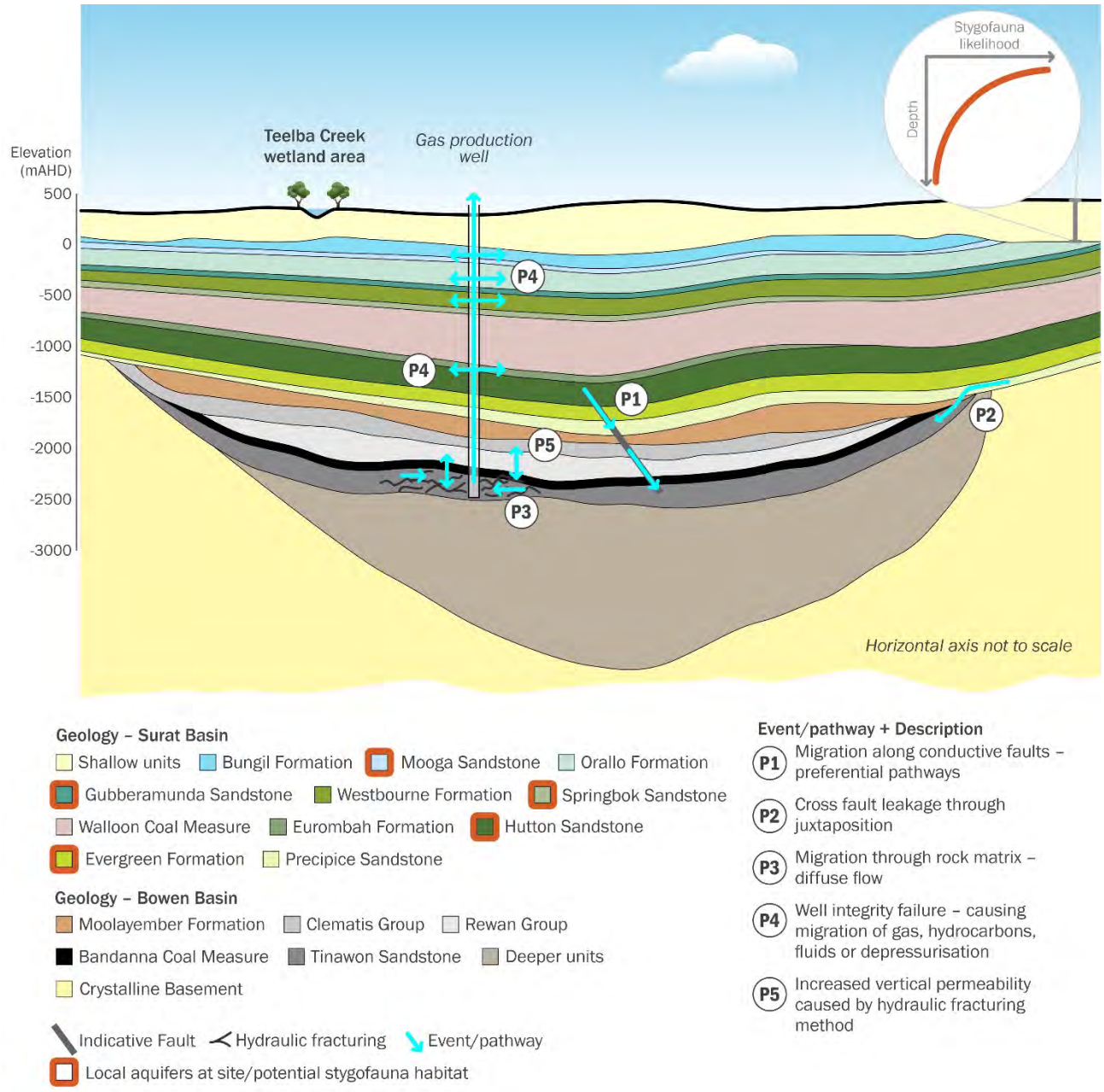


Figure 5.1 Waggamba wellfield conceptual site model

5.3 Risk summary

Based on available information, the risk of fracture stimulation fluids affecting potential subterranean ecosystems is considered low, due to:

- The negligible likelihood of subterranean ecosystem occurrence within the Upper Tinowon Sandstone.
- The negligible likelihood of pathways from the Tinowon Sandstone to shallower aquifers where subterranean ecosystems could occur.
- Any chemical or physical changes associated with fracture stimulation predicted to be confined to the stimulated interval and limited to a short distance from the well, meaning any groundwater changes are unlikely to reach sensitive ecological receptors.

Microbial communities, while likely present in the deep formation, are not considered sensitive ecological receptors in this context. While local changes to microbial assemblages within the stimulated interval may occur as a result of fracture stimulation, these are expected to be confined to the target formation and are not anticipated to result in ecologically significant impacts beyond the immediate zone of activity.

This conclusion is subject to the acknowledged information gaps, particularly the absence of site-specific hydraulic testing and groundwater quality data; however, these uncertainties do not materially alter the overall risk rating given the fundamental geological and hydrogeological constraints.

6 Limitations

This assessment is subject to the following limitations:

- It is a desktop study.
- No new field investigations were undertaken.
- Local data availability is limited.
- Assessment outcomes rely on regional and analogue data, which may not fully represent conditions at PL 1158.
- Conclusions may alter if additional data becomes available.

7 Conclusions

The findings of this desktop assessment are summarised as follows:

- Item 4.1: Regional evidence strongly suggests that the Upper Tinowon Sandstone within the region of the Waggamba field does not represent a beneficial aquifer due to low productivity, poor water quality, and deep hydraulic isolation.
- Item 4.2: Information relating to the hydraulic conductivity and qualitative residence time assessments have been discussed. The available data indicates low permeability and hydraulic conductivity for the Tinowon Sandstone, resulting in long formation water residence times.
- Item 4.3: Results from limited groundwater quality analyses have been included and discussed. The data indicates water quality unsuitable for beneficial use.

- Item 5.1: A semi-quantitative risk assessment indicates low likelihood of adverse impacts on subterranean ecosystems. There is negligible likelihood of subterranean ecosystem occurrence within the Upper Tinowon Sandstone, and negligible likelihood of pathways from the sandstone to shallower aquifers where subterranean ecosystems could occur.

Yours sincerely

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